"A PROSPECTIVE AND RANDOMIZED STUDY FOR EVALUATING THE EFFECTIVENESS AND SAFETY OF TWO STRATEGIES, PRESSURE SUPPORT VENTILATION (PSV) AND ' T'- PIECE VENTILATION FOR WEANING ADULT PATIENTS FROM MECHANICAL VENTILATOR "

Dissertation submitted to

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

In partial fulfilment for the award of the degree of

DOCTOR OF MEDICINE
IN
ANAESTHESIOLOGY

BRANCH X

INSTITUTE OF ANAESTHESIOLOGY AND CRITICAL CARE
MADRAS MEDICAL COLLEGE
CHENNAI- 600003

APRIL 2018

CERTIFICATE

This is to certify that the dissertation titled, **"A Prospective and Randomized study for evaluating the effectiveness and safety of two strategies, Pressure support ventilation (PSV) and T-piece ventilation for weaning adult patients from mechanical ventilator**" Submitted by **Dr.GOPINATH.A** in partial fulfilment for the award of the degree of DOCTOR OF MEDICINE in Anaesthesiology by The Tamilnadu Dr.M.G.R Medical University, Chennai is a bonafide record of work done by him in the INSTITUTE OF ANAESTHESIOLOGY & CRITICAL CARE" Madras Medical College, during the academic year 2015-2018.

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CERTIFICATE OF THE GUIDE

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DECLARATION

I hereby declare that the dissertation titled, **"A Prospective and Randomized study for evaluating the effectiveness and safety of two strategies, Pressure support ventilation (PSV) and T-piece ventilation for weaning adult patients from mechanical ventilator**" Has been prepared by me under the guidance of **Prof.Dr.G.R.Rajashree,MD**, Professor of Anaesthesiology, Institute of Anaesthesiology & Critical care, Madras Medical college, Chennai, in partial fulfillment of the regulations for the award of the degree of M.D(Anaesthesiology), examination to be held in April 2018.

This study was conducted by me at Institute of Anaesthesiology & Critical care, Madras Medical College, Chennai.

I have not submitted this dissertation previously to any journal or any university for the award of any degree or diploma.

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AIM OF STUDY

This study evaluates the effectiveness and safety of two strategies, Pressure support ventilation (PSV) and T piece ventilation for weaning adult patients who require elective post operative mechanical ventilation for at least 12 hours, measuring weaning success and other clinically important outcomes.

INTRODUCTION

- Ventilator is a simple machine designed to apply & transmit energy which serves to perform useful work, following a set scheme.

- Three pressures that determine the flow and, therefore, the generation of volume; these are:

  1. The atmospheric pressure (P_{atm})

  2. The alveolar pressure, the pressure within the lungs (P_{alv});

  3. The pleural pressure, the pressure generated between the lungs and the thoracic cage (P_{pl}).

Pressure Gradient

- The movement of air from outside the body to the lungs and vice versa is made by a pressure gradient between the exterior (P_{atm}) and interior of the lungs (P_{alv}).

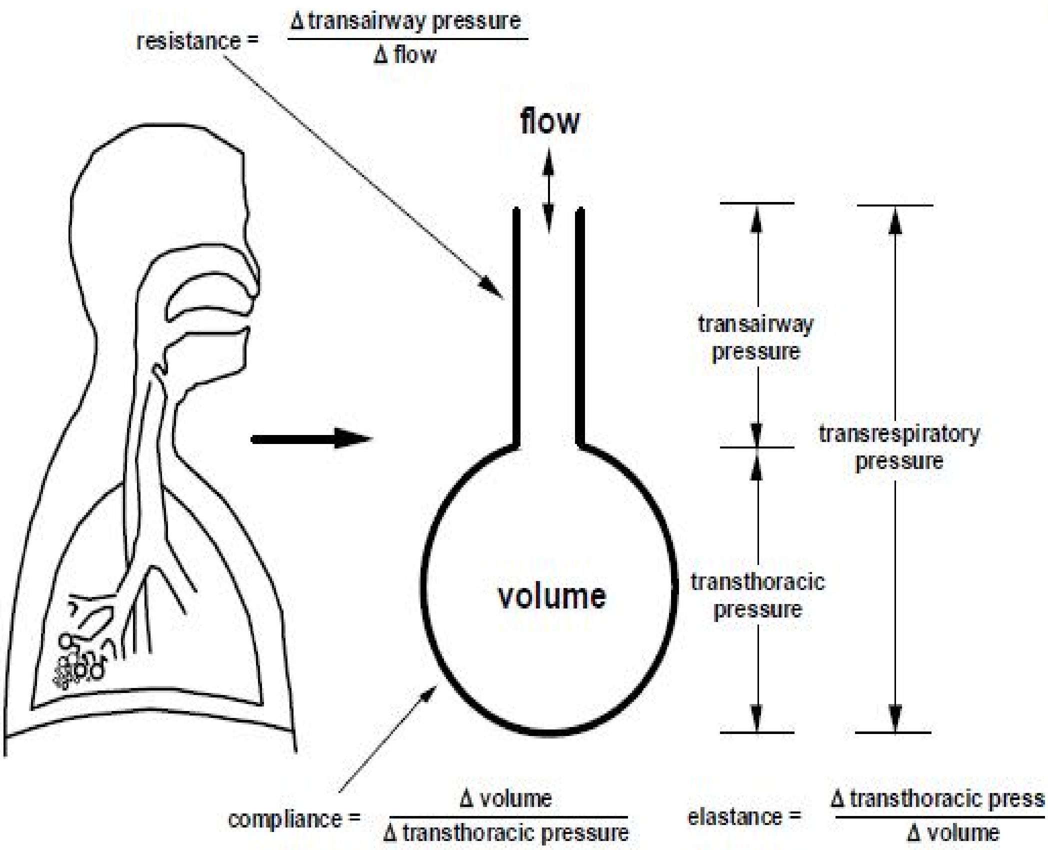
- If the P_{alv} decreases with respect to the P_{atm}, it is of negative pressure ventilation.

- If the P_{atm} (pressure at the mouth) increases with respect to the $P_{alv,}$ it is of positive pressure ventilation

- Trans-respiratory system pressure is the pressure at the airway opening minus pressure at the body surface.

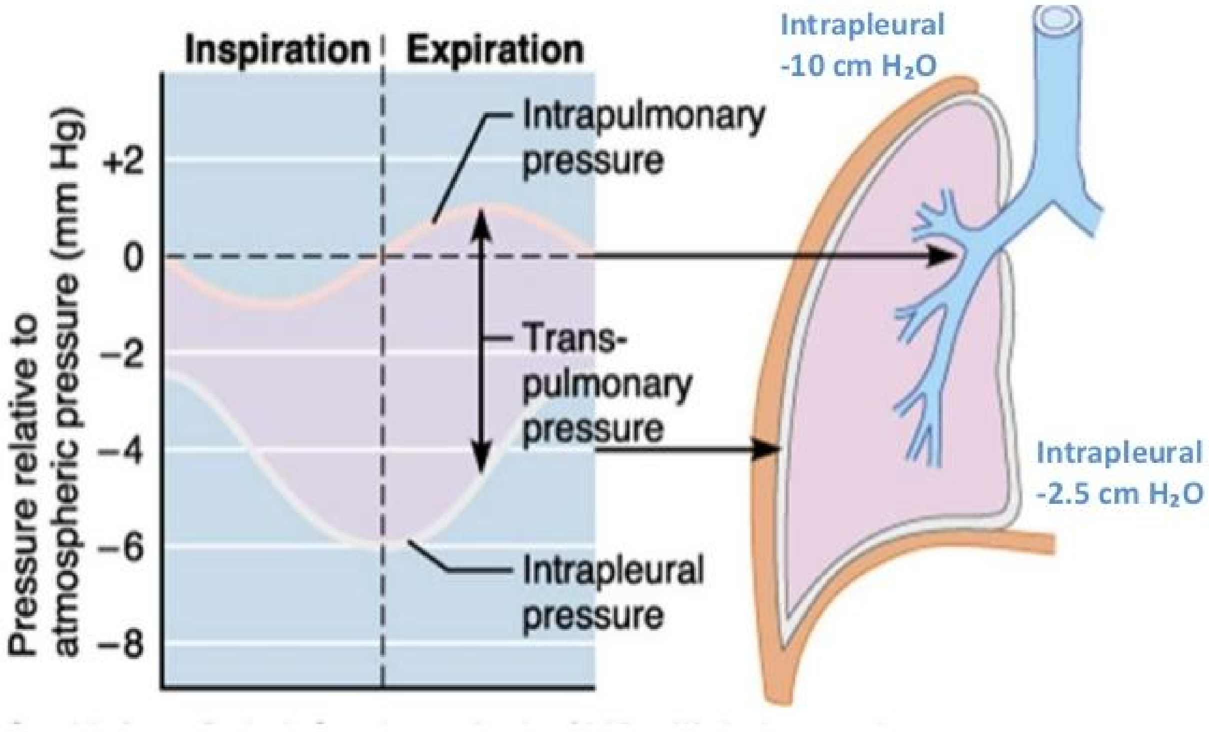
Pressure driving inspiration

- Transairway pressure-airway opening pressure minus lung pressure
- Transthoracic pressure – lung pressure minus body surface pressure.
- Transpulmonary pressure –airway opening pressure minus pleural pressure



Equation of Motion for the Respiratory System

$$P_{vent} + P_{muscles} = \text{elastance} \times \text{volume} + \text{resistance} \times \text{flow}$$

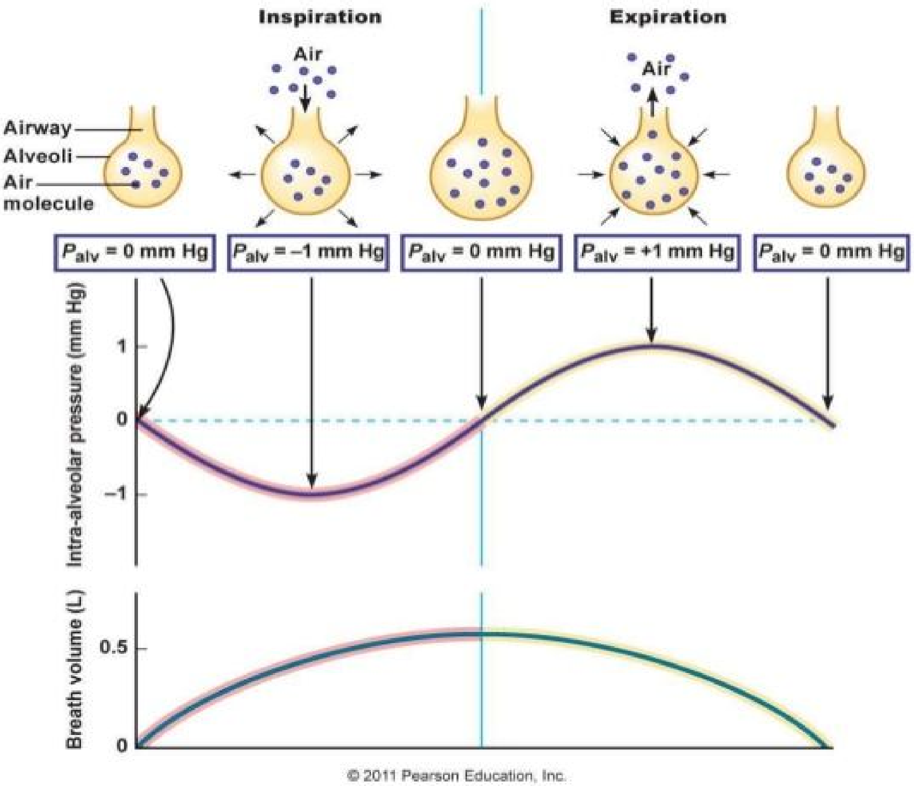


Baromatric Pressure (P_B) & Alveolar Pressure (P_{alv}) during Spontaneous Breathing

Spontaneous Breathing	P_B(cm H_2O)	P_{ALV}(cmH_2O)	ΔP	Flow
Inspiration	0	-5	-5	Into the Lungs
End of Inspiration	0	0	0	None
Expiration	0	20	-20	Out of lungs
End of Expiration	0	0	0	Nil Flow

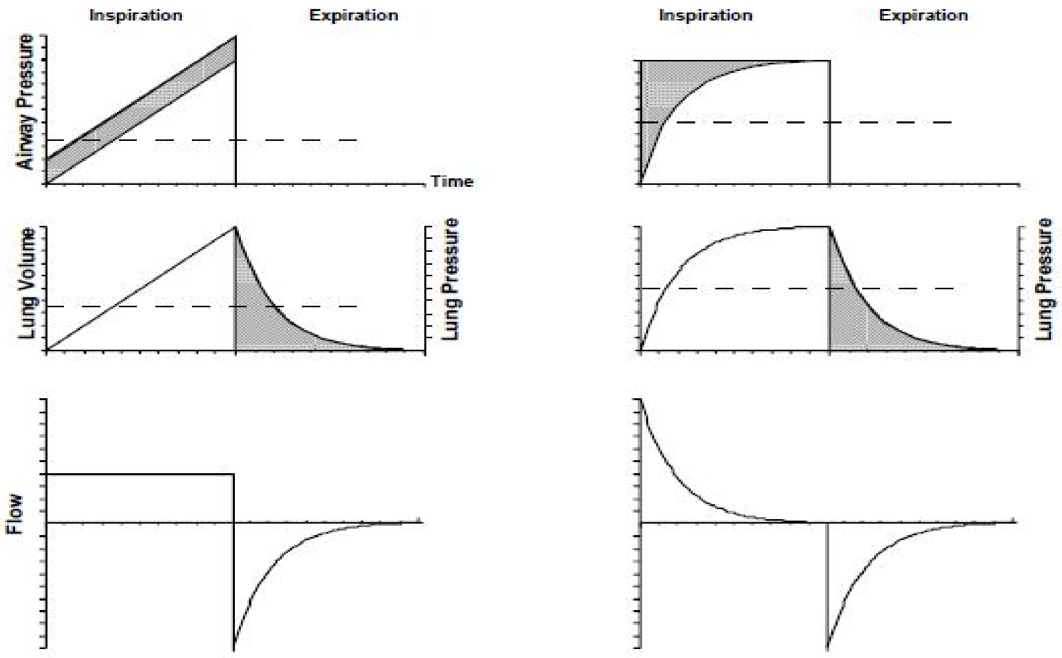
Inspiratory Pressure (P_i) & Alveolar Pressure (P_{alv}) during PPV

Positive Pressure Ventilation	**P_i(cm H_2O)**	**P_{ALV}(cmH_2O)**	**ΔP**	**Flow**
Inspiration	20	0	+20	Into the Lungs
End of Inspiration	20	20	0	Nil Flow
Expiration	0	20	-20	Out of lungs
End of Expiration	0	0	0	Nil Flow



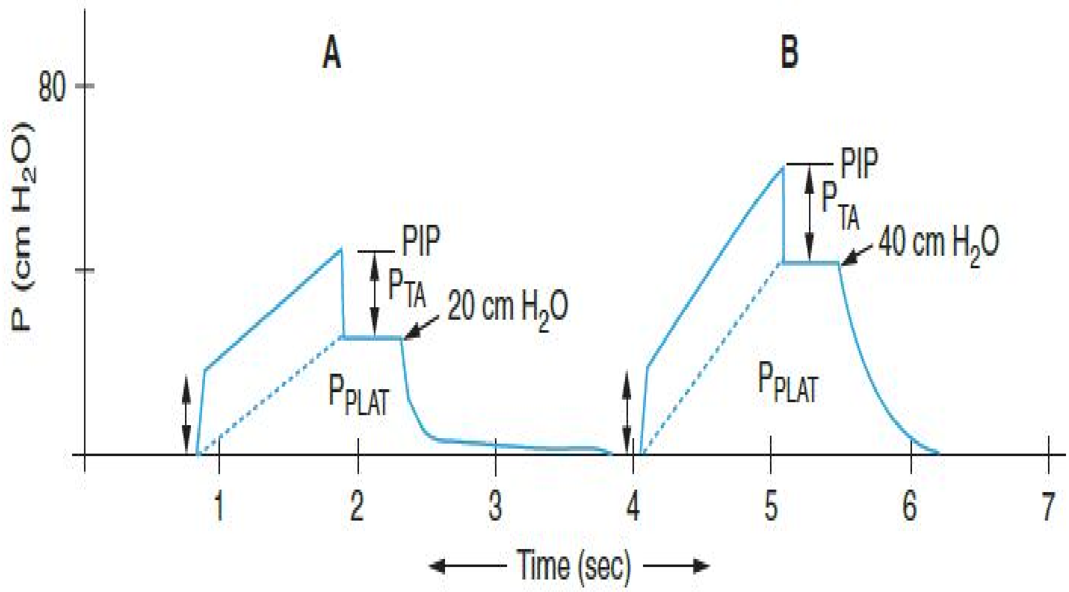
DURING POSITIVE PRESSURE VENTILATION

Comparison of volume control using constant inspiratory flow with pressure control using constant inspiratory pressure. Shaded areas show pressure due to resistance. Unshaded areas show pressure due to compliance.



COMPLIANCE

- Volume change per unit pressure change $C = \Delta V / \Delta P$.
- Static Compliance - measured when the flow is momentarily stopped
- Dynamic Compliance -Dynamic compliance is measured when airflow is present.



Compliance	Conditions
Static Compliance	Tension Pneumothorax Obesity ARDS Retained secretions Atelectasis
Dynamic Compliance	Bronchospasm Airway obstruction ET tube Kinking

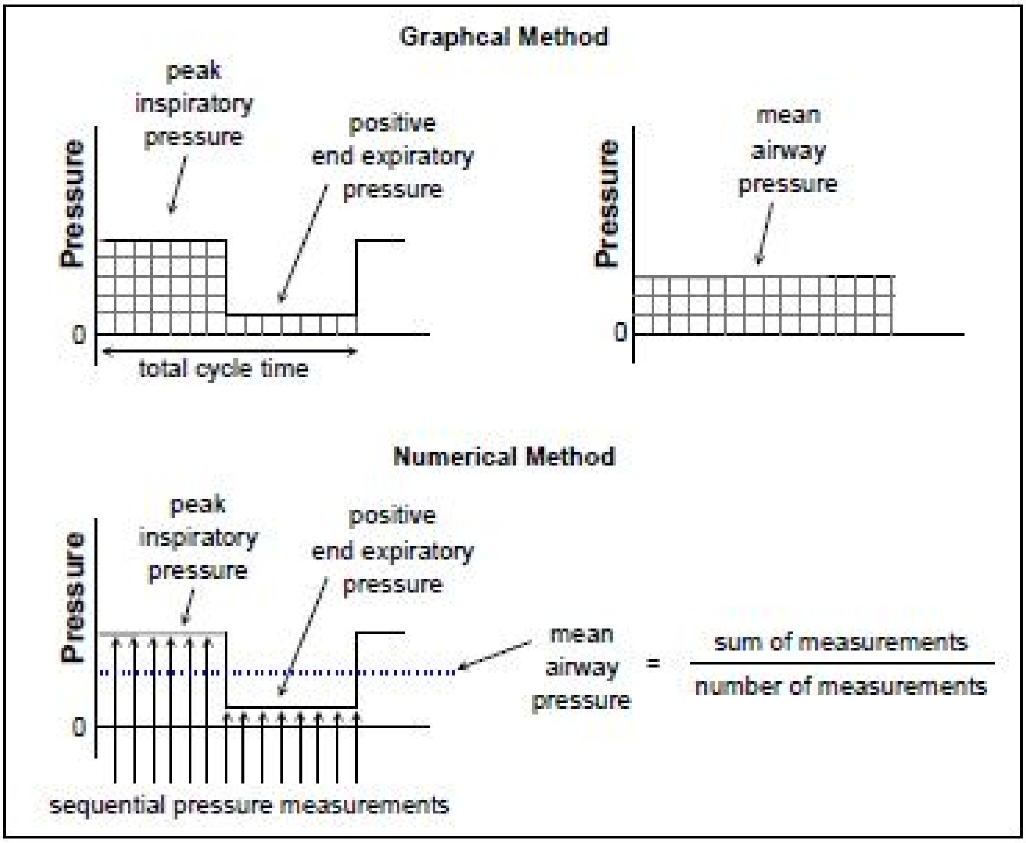
AIRWAY RESISTANCE (R)

- Airway resistance is defined as impedence offered to the flow of gas or fluid through a tube (ET tube or conducting airways)
- Affected by the size, Length(L), radius (r) and patency of the airway, endotracheal tube, and ventilator circuit
- $R = L/r^4$
- Hypoventilation occurs if the patient is can't overcome the airway resistance by increasing the work of breathing

Type	Conditions
COPD	**Emphysema** **Asthma** **Bronchiectasis** **Chronic bronchitis**
Mechanical obstruction	**Foreign body aspiration** **Post intubation obstruction** **Condensation in ventilator circuit** **Endotracheal tube**
Infection	**Layngotracheobronchitis (croup)** **Bronchiolitis** **Epiglottitis**

MECHANICAL VENTILATION

Calculating mean airway pressure



Peak inspiratory pressure:

The pressure used to deliver the tidal volume by overcoming elastic lung parenchyma and nonelastic airways resistance

Plateau Pressure:

The pressure needed to maintain lung in inflated state in the absence of airflow for diffusion of gases.

Equation for motion of the respiratory system

- **Pvent + Pmusc = Elastance x Volume + (Resistance x Flow)**

During inspiration

- Variables - Pressure, volume, and flow
- Parameters- Elastance and resistance
- Flow = Volume / Time

During expiration

- Passive process
- Resistance x Flow = Elastance xVolume.
- Minus sign at the left of the equation indicates the negative direction of the expiratory flow
- Elastance = ΔPressure/ ΔVolume
- Resistance = Δpressure/ Δflow
- Muscle pressure+ vent pressure= elastic load+ resistive load
- Elastic load is the pressure required to deliver the tidal volume.
- Resistive load is the pressure required to deliver the flow
- Compliance =Δvolume/Δpressure= 1/ elastance

MODES OF VENTILATION

A mode is a description of

1. How the ventilator is triggered or initiated into inspiration.
2. How it is cycled to expiration.
3. What variables or parameters are limited during inspiration
4. Whether the mode allows mandatory, spontaneous or assisted breath.

COMPONENTS OF A MODE

1. Breath types
2. Phase variables
3. Control variables

BREATH TYPES

- **Mandatory breath**

Started and ended by machine

- **Assisted breath**

Started by the patient but ended by the machine

- **Spontaneous Breath**

Started and ended by the patient

PHASE VARIABLES

- It refers to the four phases of a breath
- Change from expiration to inspiration - *TRIGGER*
- During inspiration – *LIMIT*
- Change from inspiration to expiration – *CYCLE*
- Expiration - *BASELINE*

TRIGGER

Initiates the breath

TIME TRIGGER

Ventilator initiates breath according to set frequency, independent of patient efforts(CMV*)*

PRESSURE TRIGGER

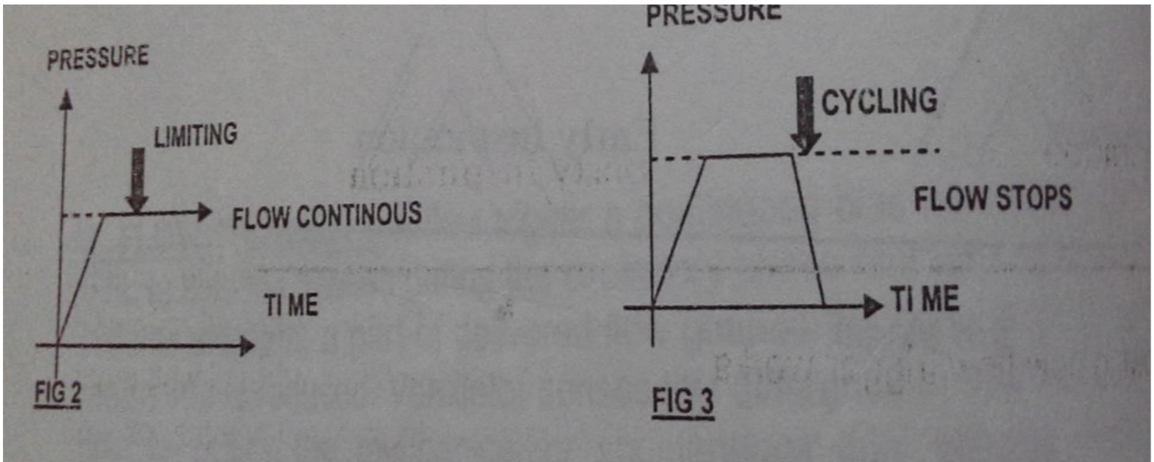
Ventilator senses the decrease in baseline pressure, independent of set frequency

FLOW TRIGGER

Ventilator senses the decrease in return flow through the circuit

LIMIT

- A variable (pressure/volume/flow) which is limited during inspiration
- IT DOES NOT TERMINATE INSPIRATION



SCALAR GRAPH PRESSURE VS TIME SHOWING LIMITING AND CYCLING

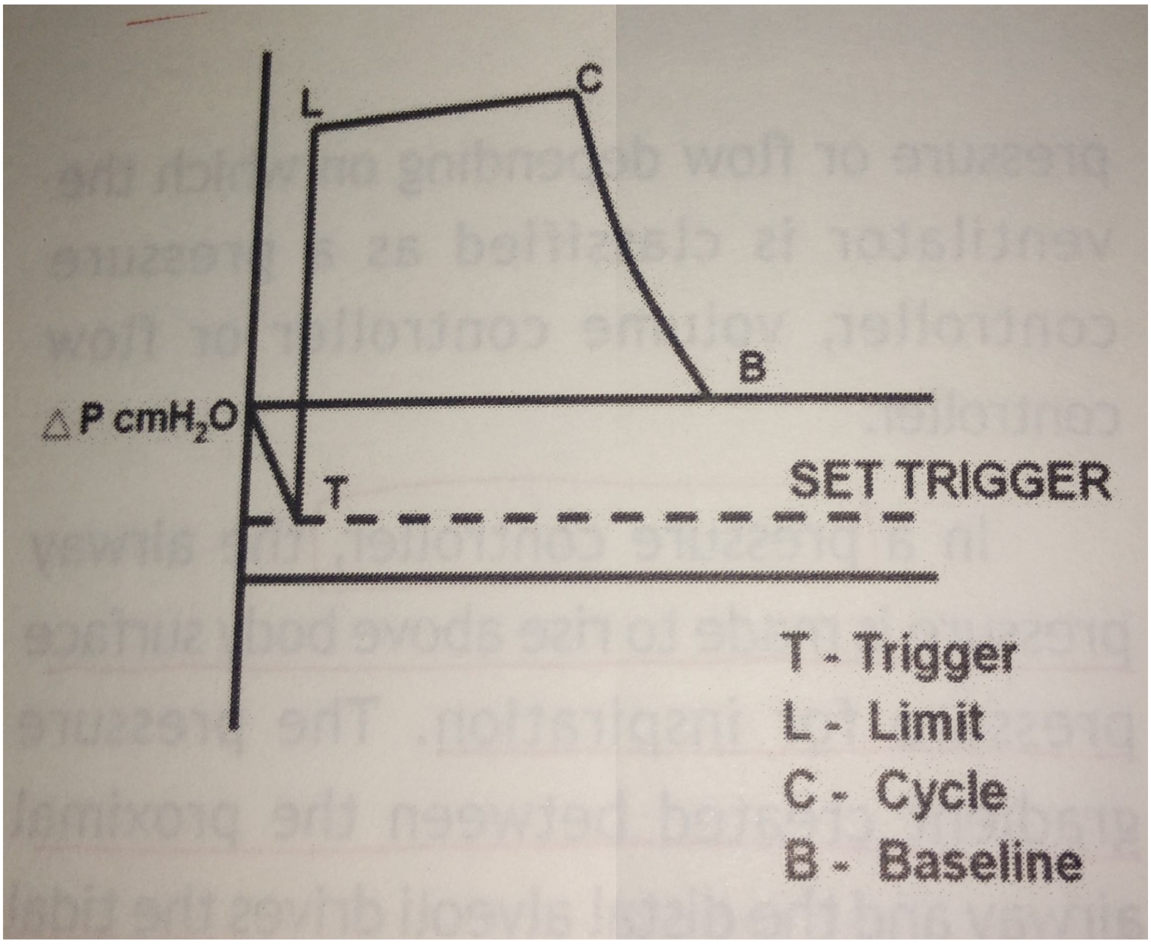
CYCLE

- It terminates inspiration and switch over to expiration
- It could be time, pressure, volume or flow

BASELINE

Variable that is controlled during the expiratory time (Pressure)

If the pressure is held higher than ambient pressure, it is called PEEP



CONTROL VARIABLE

- Denotes which (parameter) variable we are going to set/control
- **VOLUME**
- **PRESSURE**
- **TIME**
- If the variable / parameter eg: volume is controlled then that remains constant and the other variable/ parameters may vary.

MECHANICAL VENTILATOR

CLASSIFICATION OF CONVENTIONAL MODES

Conventional modes are classified into 2 types based on the two components of a mode.

1. Based on type of breath
2. Based on control variables

BASED ON TYPE OF BREATH

- **CMV – CONTINUOUS MANDATORY VENTILATION**
- **IMV- INTERMITTENT MANDATORY VENTILATION**
- **SIMV- SYNCHRONOUS INTERMITTENT MANDATORY VENTILATION**

BASED ON CONTROL VARIABLES MODES ARE CLASSIFIED

1. **Pressure control or pressure preset**
2. **Volume control or volume preset.**

Example:

If the volume is controlled then the pressure may vary depending on the compliance of the lung.

VOLUME CONTROL

ADVANTAGES

- Guaranteed tidal volume
- Less chance of atelectasis

DISADVANTAGES

- Limited flow available may not meet patient’s desired flow rate.
- Can cause excessive airway pressure (BAROTRAUMA)

PRESSURE CONTROL

The pressure gradient created between the proximal airway and the distal alveoli drives the tidal volume in to the lungs

ADVANTAGES

- Constant Peak airway pressure is maintained
- Improves gas distribution
- Lowers Work of breathing

DISADVANTAGES

- Variable Tidal Volume

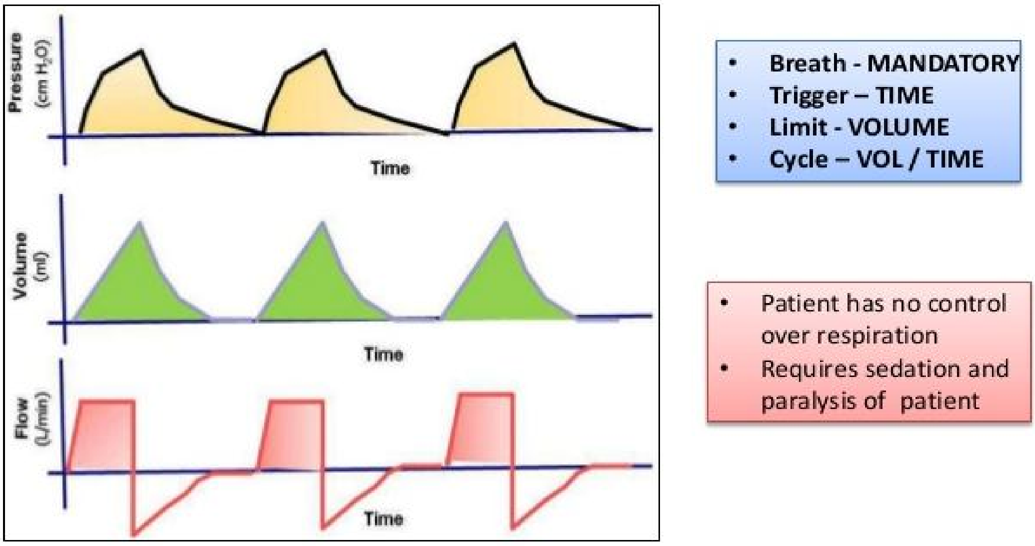
VOLUME VERSUS PRESSURE CONTROL MODE VENTILATION

Volume Ventilation	Pressure Ventilation
Volume delivery constant	Volume delivery varies
Inspiratory pressure varies	Inspiratory pressure constant
Inspiratory flow constant	Inspiratory flow varies
Inspiratory time determined by set flow and Tidal Volume	Inspiratory time set by clinician

Controlled Mandatory Ventilation (CMV)

- In this mode, the ventilator delivers a preset tidal volume at a time-triggered respiratory rate.
- It control the patient's minute ventilation.
- Requires Sedatives and neuromuscular blockers.
- ***Mandatory breath*** – ventilator determines the start time (time triggered) and/or the volume or pressure limited

Controlled Mandatory Ventilation (CMV/VCV)



Appropriate when a patient can make no effort to breathe or when ventilation must be completely controlled

- Spinal cord injury
- Cerebral malfunctions
- Motor nerve paralysis
- Phrenic nerve injury
- Controlled ventilation is difficult to use unless the patient is sedated or paralyzed with medications
  - Intra operative controlled ventilation

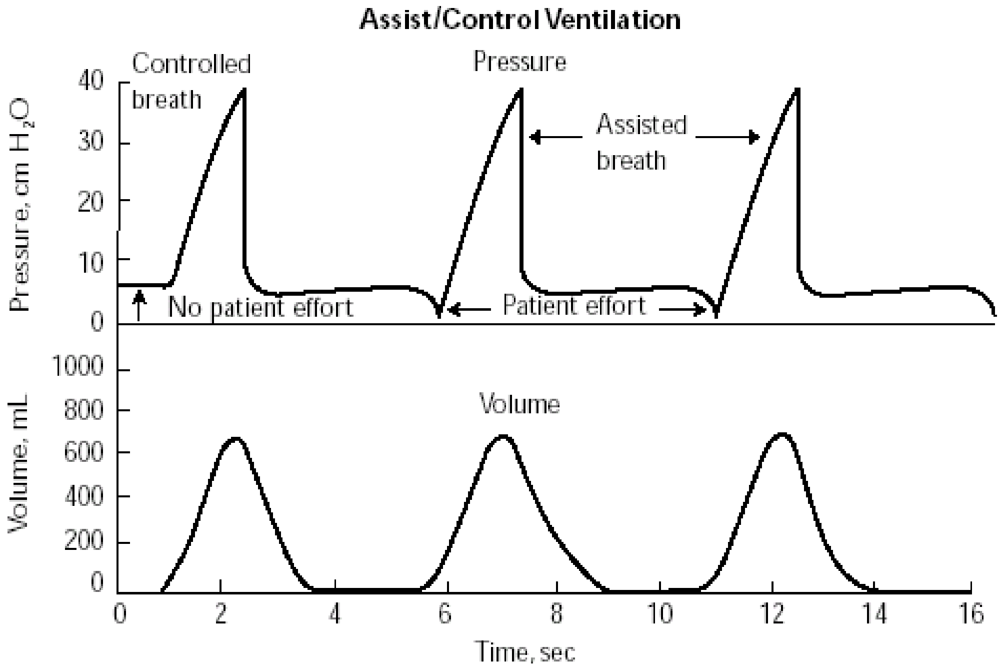
- Seizure activity
- Tetanic contractions
- Complete rest for the patient
- Crushed chest injury – stabilizes the chest

The primary hazard associated with control mode is potential for ***apnea and hypoxia if patient have accidentally disconnected*** from ventilator or ventilator failed to operate

ASSIST CONTROL MODE (ACMV)

- In this mode, the mandatory breaths may be either ***patient triggered (assist)*** or ***time triggered*** by a preset respiratory rate (***control***).
- ***Minute ventilation can be increased*** by patient.
- Useful in pts with stable respiratory drive. Trigger level should be appropriate

MODE	INITIATE	CONTROL	CYCLE
VOLUME ACMV	PATIENT OR TIME	VOLUME	FLOW OR VOLUME
PRESSURE ACMV	PATIENT OR TIME	PRESSURE	TIME



INDICATIONS

- This mode of ventilation is often used to provide full ventilatory support for patients when they are first placed on mechanical ventilation.

- Typically used for patients who have stable respiratory drive and average Respiratory Rate and can therefore trigger .

    - Advantages

        - Decreases the work of breathing

        - Allows patients to regulate respiratory rate

    - Complications

        - Alveolar hyperventilation

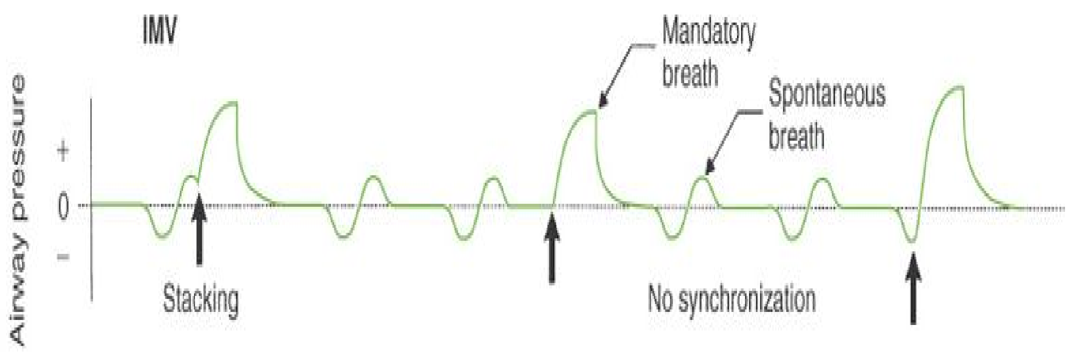
        - ***TRIGGER – time / patient***

        - ***LIMIT- volume / pressure***

        - ***CYCLE- volume / time***

INTERMITTENT MANDATORY VENTILATION

- Mandatory breath (volume or pressure targeted breaths) occur at set interval (time triggering)
- Between mandatory breaths, the patient ***breathes spontaneously*** at any desired baseline pressure without receiving a mandatory breath
- Mechanical rate and spontaneous rate may become asynchronous causing "***stacking***"
- May cause barotrauma or volutrauma



SYNCHRONISED IMV (SIMV)

- The patient receives the Mandatory set Volume at set Respiratory Rate
- The set Mandatory breaths are synchronized with patient efforts.

- Between the mandatory breaths the patient can breath spontaneously

- Triggering - Time or patient

Limiting - Volume / pressure

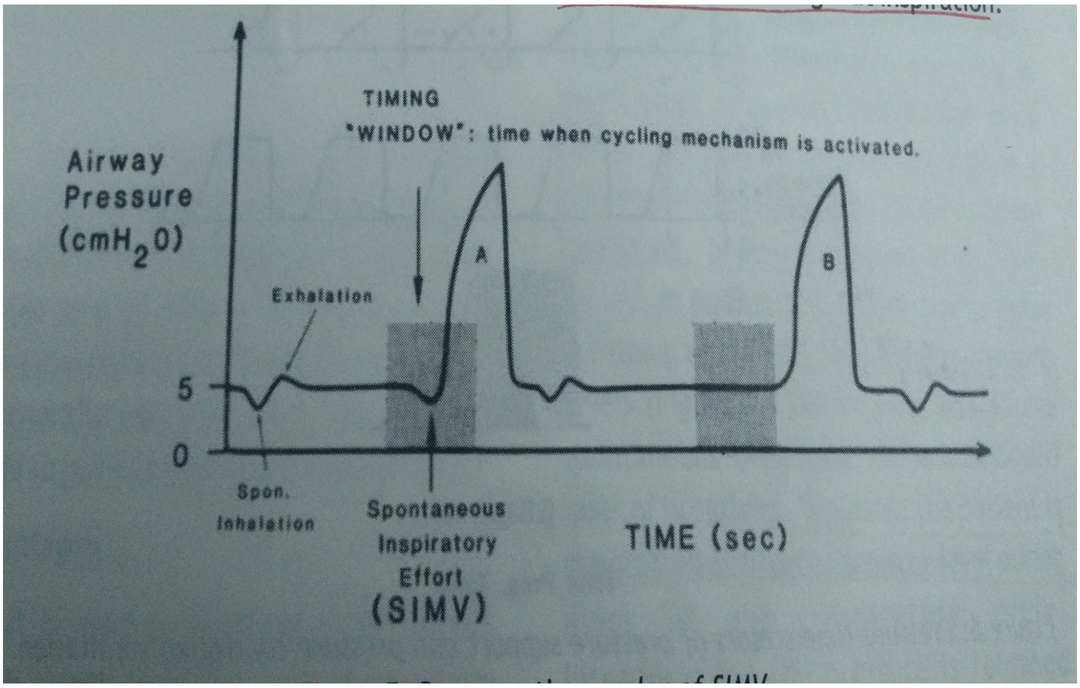
Cycling - Volume / time

SYNCHRONISATION / TIMING WINDOW

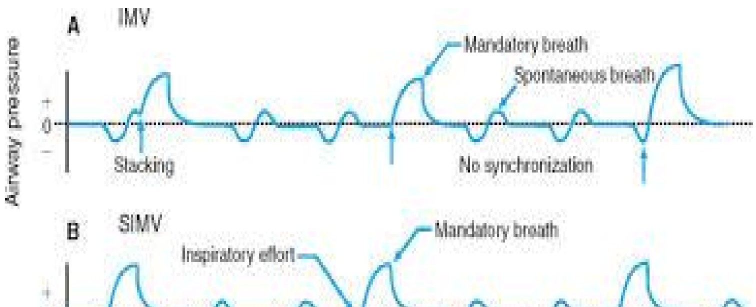
- The time interval just *prior to time triggering* in which ventilator is responsive to patient's spontaneous inspiratory effort is known as synchronisation window.

- Time interval of 0.5s is representative.

- If patient makes a spontaneous inspiratory effort when synchronisation window is active, ventilator will deliver an assisted patient triggered breath



TIMING
"WINDOW": time when cycling mechanism is activated.
Airway
Pressure
(cmH2O)
Exhalation
A
B
5
0
Spon.
Inhalation
Spontaneous
Inspiratory
Effort
(SIMV)
TIME (sec)



A
IMV
Airway pressure
Mandatory breath
Spontaneous breath
Stacking
No synchronization
B
SIMV
Inspiratory effort
Mandatory breath
All mandatory breaths synchronized
to patient's inspiratory effort
Time

Indications

- Facilitate transition from full ventilatory support to partial support

- **Advantages**

  - Decreases mean airway pressure

  - Facilitates ventilator discontinuation – "weaning"
  - Maintains respiratory muscle strength by avoiding muscle atrophy

COMPLICATIONS

- Desire to wean the patient too rapidly may lead to high work of spontaneous breathing leading to ***muscle fatigue*** and weaning .

- The best way to avoid this is to decrease SIMV mandatory respiratory rate slowly and monitor the patient closely for signs of fatigue.

PRESSURE SUPPORT VENTILATION (PSV)

- The ***ventilator provides a constant pressure*** during inspiration once it ***senses*** that the patient has made an ***inspiratory effort***

- Pressure supported breath are considered ***spontaneous***

- Patient triggered

- Tidal Volume varies with patient's inspiratory flow demand
- Inspiration last only for as long as the patient actively inspires
- Inspiration is terminated when inspiratory flow demand reaches the preset value
- ***Trigger – Patient***
- ***Limit – Pressure***
- ***Cycle – flow***

ADVANTAGES

- Augments the patients **spontaneous Tidal Volume**
- **Decreases patient Work of Breathing** by overcoming the resistance of the artificial airway, vent circuit and demand valves
- Prevents respiratory **muscle atrophy**
- Facilitates **weaning**
- Improves **patient comfort** and reduces need for sedation
- May be applied in any mode that allows spontaneous breathing, e.g., VC-SIMV, PC-SIMV

Disadvantages

- Requires consistent **spontaneous ventilation**
- Patients in stand-alone mode should **have back-up ventilation**
- **Tidal Volume variable** and dependant on lung characteristics and synchrony
- **Fatigue and tachypnea** if Pressure Support level is set too low

SIMV WITH Pressure Support

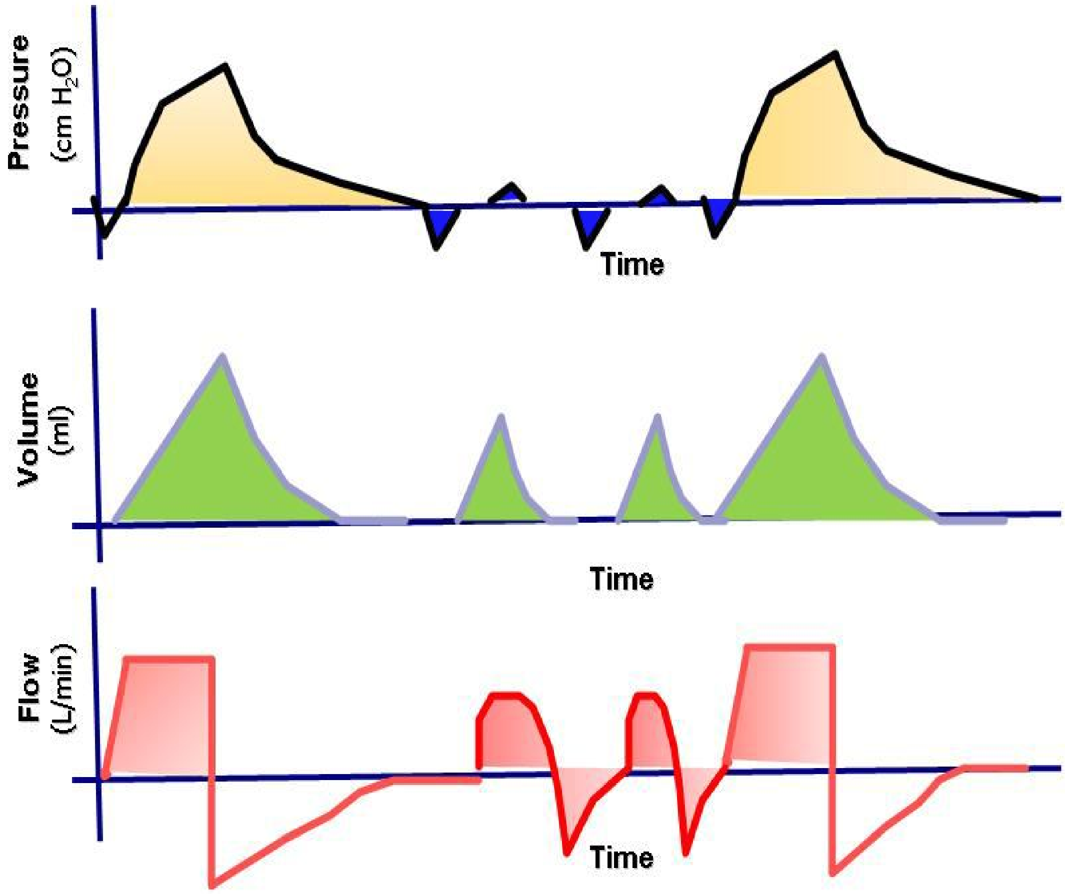
- Pressure support is commonly applied in SIMV mode when patient take spontaneous breaths.
- To facilitate weaning in a difficult to wean patient.

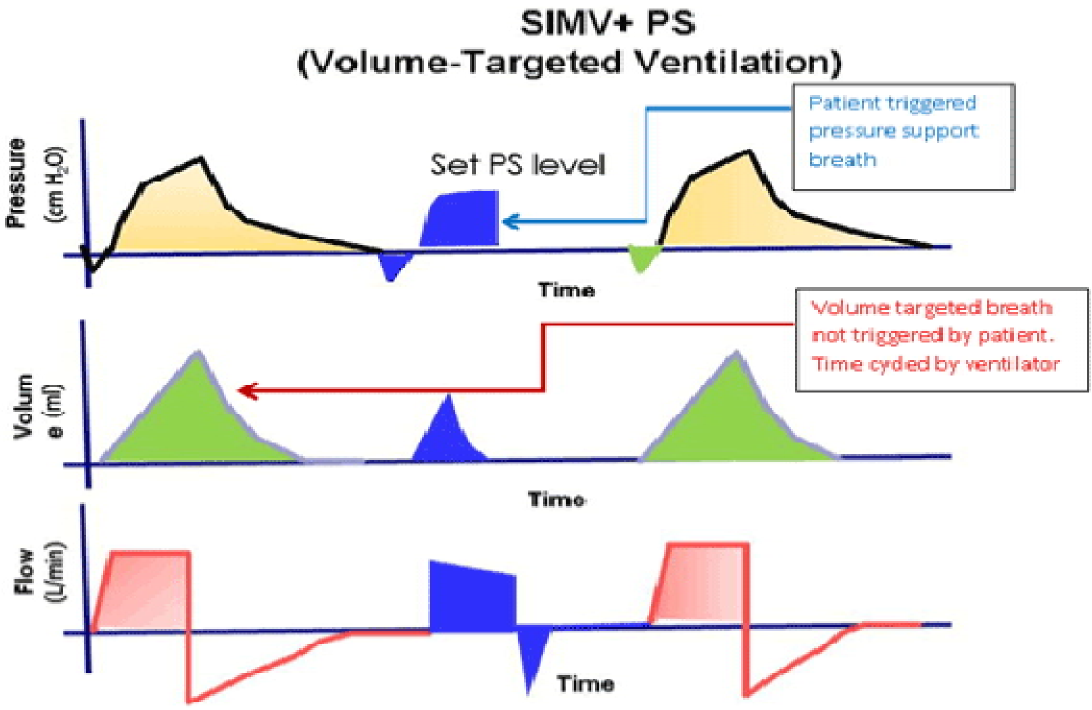
In this mode, pressure support

- Increase patient's spontaneous Tidal Volume
- Decrease patient's spontaneous Respiratory Rate

decreases the work of breathing

SIMV
(Volume-Targeted Ventilation)





PEEP

- Pressure above ambient at the end of expiration
- Not a stand alone Mode

Indications:

- Intrapulmonary shunt & refractory hypoxemia,
- Decreased FRC and lung compliance
- **Auto PEEP**
    - Helps prevent early airway closure and alveolar collapse and the end of expiration by increasing (and normalizing) the functional residual capacity (FRC) of the lungs
    - Facilitates better oxygenation

PEEP is intended to improve oxygenation, not to provide ventilation, which is the movement of air into the lungs followed by exhalation

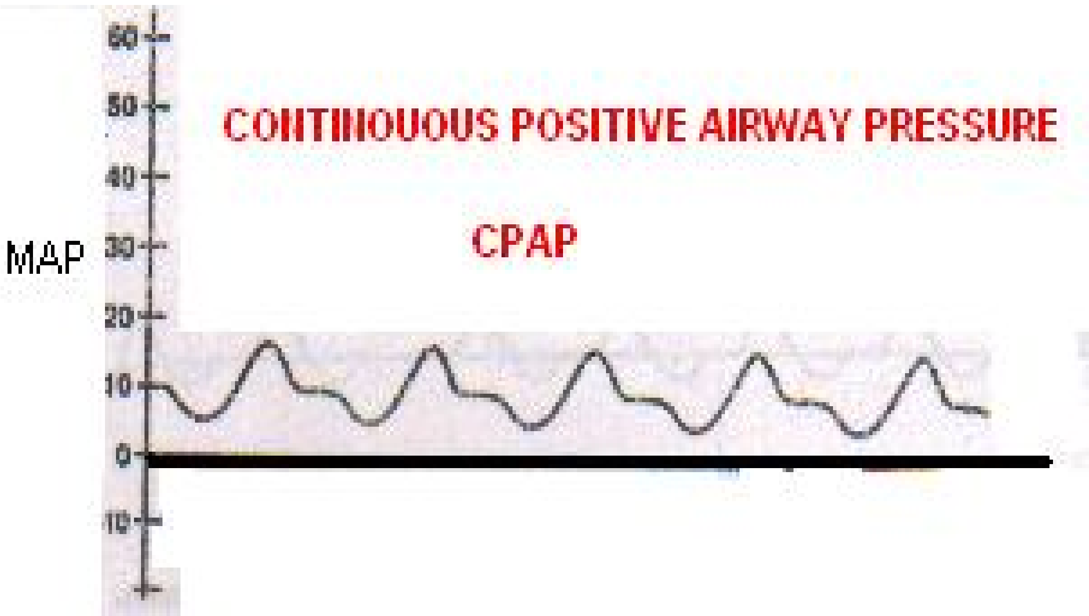
Complications

- Decreased Venous return & Cardiac output
- Barotrauma
- Increased ICT
- Decreased Renal perfusion

CPAP

It is ***PEEP*** applied to the airway of the ***Spontaneously breathing*** patients

- Helpful for improving oxygenation in patients with refractory hypoxemia and a low FRC
- CPAP setting is adjusted to provide the best oxygenation with the lowest positive pressure and the lowest FiO2
- Advantages
- Ventilator can monitor the patient's breathing and activate an alarm if something undesirable occurs



Pressure remains positive and do not return to zero baseline

- **CMV - all breaths are mandatory**

- **ACMV - two types of breath, assisted and mandatory as back up.**

- **IMV - TWO types of breath ,mandatory and spontanous.**

- **SIMV - 3 types of breath- mandatory , assisted and spontanous.**

- **Spontaneous (CPAP/BiPAP) - all breaths are spontaneous**

WEANING FROM MECHANICAL VENTILATION

- **WEANING SUCCESS**
- **WEANING IN PROGRESS**
- **WEANING FAILURE**

VENTILATORY CRITERIA

- $PaCo_2$ -<50 mm Hg
- Vital capacity (>10 ml/kg) and spontaneous tidal volume (>5 ml / kg)
- Spontaneous frequency - <35 / min
- f/Vt - >105 breaths/min/L
- Minute ventilation - <10 L

Oxygenation criteria

- PaO_2 - (>60 or >100 mm Hg)
- SaO_2 > 90 %
- PaO_2 / FiO_2 - >200 mm Hg
- Qs / Qt - <20 %
- $P(A-a)O_2$ - <350 mm Hg

Pulmonary reserve and Pulmonary Measurements

- Static compliance
    - = Δ V / Δ P- 30 ml /cm H20
- Airway resistance (0.6 – 2.4 cm H20)
- Dead space / tidal volume Ratio
    - VD/ VT = (PaCo2 – PECo2)/ PaCo2
    - Should be <60 %

Rapid Shallow Breathing Index

- Spont. Breathing frequency /spon.tidal volume
- >100 breaths/ lit /min – weaning failure
- < 100 Breaths/Lit/min – weaning success

Category	Example	Note
Clinical Criteria	Resolution of acute phase of disease Absence of excessive secretions Adequate cough Cardiovascular and hemodynamic stability	
Ventilatory Criteria	Spontaneous breathing trial	Tolerate 20 to 30 min
	Vital capacity	>10 mL/kg
	$PaCO_2$	<50 mm Hg with normal pH
	Spontaneous Tidal volume	>5 ml/Kg
	Spontaneous Resp. rate	<35/min
	TV/RR	<100 breaths/min/Lit*
	Minute Volume	<10 L with good ABG
Oxygenation Criteria	PaO_2 without PEEP	>60 mm Hg at F_iO_2<40%
	PaO2 with PEEP (≤8 cm H_2O)	>100 mm Hg at F_iO_2<40%
	P_aO_2/F_iO_2 (PF Ratio)	≥150 mm Hg
Pulmonary Measurements	Airway resistance	Stable or improving
	Static compliance	>30 ml / cm H_2O
	V_D/V_T	<60% with ET tube
Pulmonary reserve	Max. Insp. pressure	> -30 cm H_2O in 20 sec
	Vital capacity	>10 ml/kg

WEANING PROCEDURE

SPONTANEOUS BRAETHING TRIAL

CPAP –PSV or T – Piece

Spontaneous Breating for 90 min

PSV up to 8 cm H2O in CPAP

T-Piece

Assess the pt

Extubate if ABG normal

SIMV

Reduce the frequency by 1 – 3 breaths / min

↓

MONITOR SpO_2

↓

Reduce it further until a frequency of 2 – 4

↓

Extubate if ABG NORMAL

PRESSURE SUPPORT VENTILATION

Decrease the airflow resistance

↓

Spontaneous breathing must

↓

Start with 15 cm H_2O (MAX -40)

↓

Decrease by 3 to 6 cm H_2O up to 8cm H_2O

↓

EXTUBATE if ABG normal.

MONITORING IN MECHANICAL VENTILATION

Monitoring patient's clinical condition

- Important because clinical status changes rapidly and unpredictably.
- **Parameters monitored**
- Vital signs
- Chest inspection, auscultation
- Fluid balance & anion gap
- ABG
- **Non-invasive monitoring**
- Monitoring Heart Rate

Tachycardia :

- Hypovolemia
- Hypoxemia
- Anxiety and stress
- Shock
- Fever
- Pain

Bradycardia :

- Suctioning
- Drug reaction (morphine)
- Hypoxia
- Heart block
- Inadequate coronary blood flow
- Hypothermia

Monitoring blood pressure

Hypertension

- Stress
- Anxiety
- Pain
- Drugs (adrenaline)
- Polycythemia
- Fluid over load

Hypotension

- ↓venous return due to PPV
- Absolute hypovolemia
- Septic shock
- Myocardial depression
- Pneumothorax

Monitoring respiratory rate

- Pain
- Anxiety

- Shock
- Tension pneumothorax
- Fever
- Tube displacement, block
- Inappropriate settings

ABG

- 1 hr after starting ventilation
- After change of settings
- Fall in saturation or clinical worsening
- Pre and post weaning
- $ETCO_2$ &Spo_2 monitoring reduces need for ABG

VENTILATION:

- hypoventilation & respiratory acidosis
- hyperventilation & respiratory alkalosis

OXYGENATION: assessed by PaO_2, $P(A\text{-}a)\ O_2$,

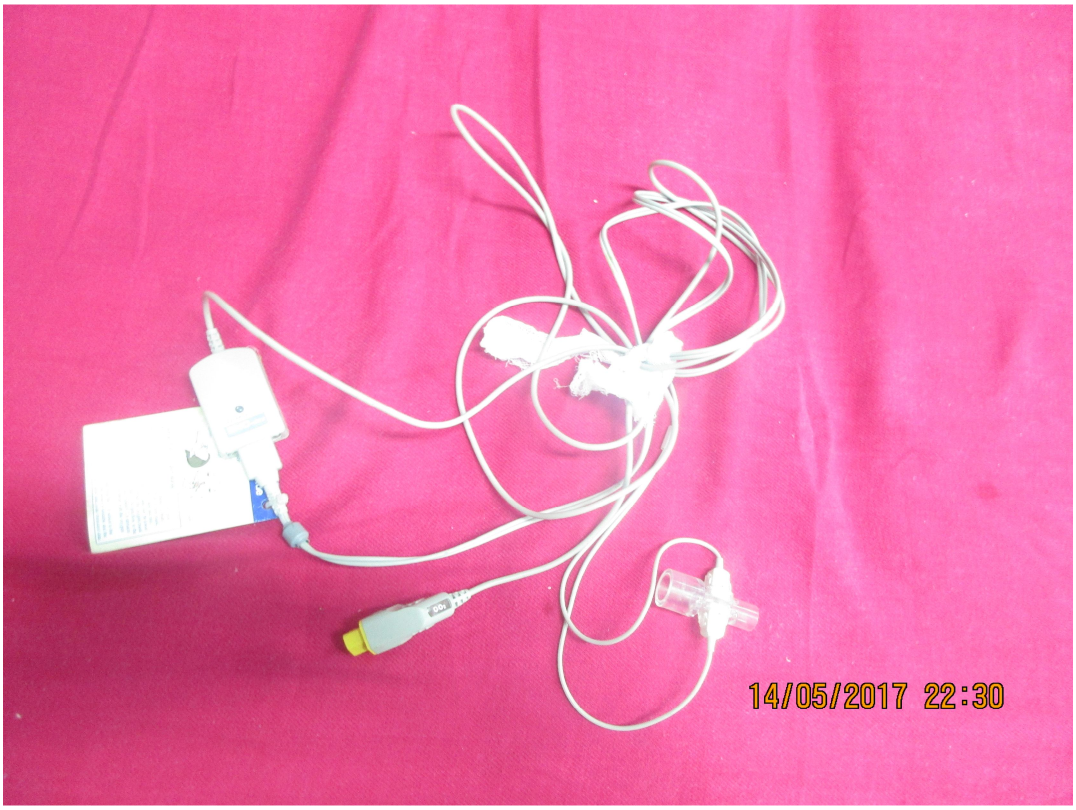
$PaO_2/PA\ O_2$, PaO_2/FiO_2

INTERPRETATION OF OXYGENATION STATUS	
PARAMETERS	**CRITERIA**
PaO2	80-100 mm Hg :normal
	60-79 mm Hg :mild hypoxemia
	40-59 mm Hg :moderate hypoxemia
	<40 mm Hg :severe hypoxemia
PaO2/FiO2	<300 mm Hg :ALI
	<200 mm Hg :ARDS
P(A-a)O2	5-10 mm Hg : normal
PaO2/PA O2	>75% : normal
	<75% :hypoxemia

Non invasive monitoring

- ET CO_2
- ECG
- NIBP
- SpO2
- TEMPERATURE

MONITORING ETCO$_2$



REVIEW OF LITERATURE

1) Ely *et al* (1994) showed that immediate extubation after successful trials of spontaneous breathing expedites weaning and reduces the duration of mechanical ventilation as compared with a more gradual discontinuation of ventilatory support.

2) Brochard *et al(1994)* Showed there was no difference in the duration of weaning between the T-piece and SIMV groups, but PSV led to significantly shorter duration of weaning compared with the combined T-piece and SIMV cohorts (5.7±3.7 days versus 9.3±8.2 days).

3) Esteban *et al* (1995) showed (76%) patients were successfully extubated on their first day of weaning after a T-piece trial. The 24% patients who failed were randomized to undergo weaning by the following strategies: once a day T-piece trial; two or more T-piece or continuous positive airway pressure trials each day as tolerated; PSV with attempts at reduction of 2–4 cmH2O at least twice a day; and SIMV with attempts at reduction by two to four breaths/min at least twice a day. Patients assigned to the four groups. The weaning success rate was significantly better with once daily and multiple T-trials than with PSV and SIMV. PSV

was not superior to SIMV. The median duration of weaning was 5 days for SIMV, 4 days for PSV and 3 days for the T-piece regimens. The studies by Brochard *et al* and Esteban *et al* yielded two important common conclusions: first, the pace of weaning depends on the manner in which the technique is applied; and second, that SIMV is the least efficient technique of weaning. With respect to PSV and intermittent trials of T-tube, a clear superiority of one technique over the other has not yet been established..

4) Matic et al (2004) studied T-tube and pressure support ventilation (PSV) as two methods of weaning patients from mechanical ventilation. PSV was the superior method of weaning according to rate of successful extubation, time of weaning from mechanical ventilation, total time of mechanical ventilation, and length of hospital stay

5) Koh et al studied 42 weaning trials in 36 patients with respiratory failure requiring at least three days of mechanical ventilation in a medical ICU. All patients were intubated with an 8-mm endotracheal tube and managed using pressure controlled ventilation. When the primary disease process was judged to be improved and oxygenation was adequate on FiO_2 = 0.5, PEEP less than 6 cm H_2O, patients were switched to 15 cm H_2O PSV and

weaned to minimal pressure support (PSmin) as quickly as possible (3-5 cm H_2O per hour). PSmin was determined as peak flow rate (during spontaneous ventilation) x total respiratory system resistance on the ventilator without positive pressure. Total resistance was determined during a controlled breath. When patients were weaned to this level, they were randomized to be either extubated immediately or placed on an additional hour of T-piece breathing. If they showed signs of respiratory distress or decline in gas exchange, weaning failure was diagnosed. If this was following T-piece trial, extubation was delayed until they successfully completed the trial.

Weaning failure occurred 16 times in 14 patients out of the 42 trials performed. Therefore, 70% of the immediate extubation group remained extubated while only 55% of the T-piece group was able to complete the trial and remain extubated. This difference, however, was not statistically different. Patients who failed one method were crossed over for weaning and about half were successfully weaned using the other method. Two patients failed by both methods. Reintubation rates in the initially successful patients were identical in the two groups, 18% in the T-piece and 20% in the PSV group; noninvasive ventilation was used in four patients to avoid reintubation. Prior to weaning, respiratory indices were not different, including: tidal volume, respiratory rate, minute ventilation, rapid shallow breathing index (spontaneous respiratory rate divided by average tidal volume), work of breathing, respiratory drive, and duration of ventilation (> 10 days). Patients were older (65 vs 55 years) in the T-piece group, had slightly higher albumin level (3.0 vs 2.7 mg%), and lower APACHE II scores (33 vs 38). However, none of these differences were reported as statistically significant. (Koh Y, et al. *J Crit Care* 2000;15:41-45.)

MATERIALS & METHODS

In our study 60 subjects was chosen (Group A-Weaning from mechanical ventilation after PSV & Group B- Weaning from mechanical ventilation after T Piece ventilation)

INCLUSION CRITERIA:

- Age : 18 years to 60 yrs
- ASA : I,II,III
- Abdominal surgery cases
- Post op cases not extubated on table
- Patients require post op invasive ventilation atleast for 12 hrs
- Who have given valid informed consent.

EXCLUSION CRITERIA:

- Not satisfying inclusion criteria.
- Patients with difficult airway
- Lack of written informed consent
- Pregnant female
- Bleeding disorder
- Poor lung compliance such as pulmonary fibrosis
- Patient refusal.

- Patients with severe cardiovascular ,respiratory, renal, hepatic diseases.
- Post-Cardiac arrest patients

Materials:

- Mechanical ventilator
- T-Piece circuit
- ABG Analyser
- Monitors – ECG, NIBP, SPO_2, $EtCO_2$.

STUDY OUTCOME MEASURES:

- Successful spontaneous breathing trial
- Successful extubation
- Extubation failure
- Inspired oxygen fraction (FiO_2)
- Partial arterial oxygen pressure (PaO_2)
- CO_2 pressure arterial ($PaCO_2$)
- Length of PACU stay

METHODOLOGY OF STUDY

This study was done at the Institute of Anaesthesiology and critical care, Madras Medical College between March to September 2017. The aim of this study is to evaluate the effectiveness and safety of two strategies, pressure support ventilation (PSV) and spontaneous breathing trial with T piece, for weaning adult patients undergone upper abdominal surgeries who required post operative elective mechanical ventilation for at least 12 hours, measuring weaning success and other clinically important outcomes. Patients were excluded if they have difficult airway, Pregnant female, Bleeding disorder, Poor lung compliance such as pulmonary fibrosis, Patients with severe cardiovascular, respiratory, renal, hepatic diseases, Post-Cardiac arrest patients. Patients were randomly allocated according to the computer generated sequence into two equal groups. There were no difference between Group A(PSV= 30 patients) and the group B(T-piece =30 patients) before connecting the patient to mechanical ventilator. Patients in both the groups connected to mechanical ventilator were in assisted controlled mode of ventilation (Volume control) with Fio2-100% in a paralysed state after receiving from operation theatre. Baseline HR, SBP, DBP, ETCO2, SPO2 monitored. Baseline ABG sent. Analgesia with elastomeric continuous epidural infusion pump 5ml/hr (0.125 % Bupivacaine and 1mcg of

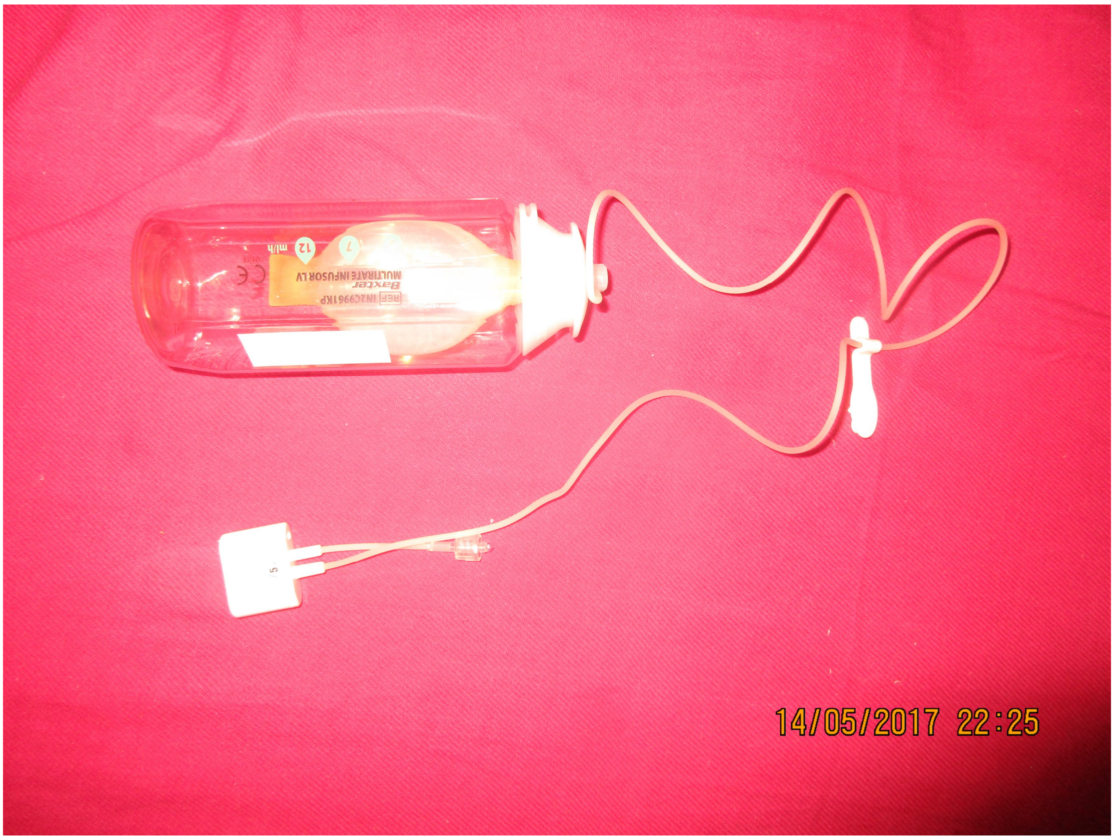
Fentanyl)started. Patient weaned to VcSIMV mode of ventilation when patient improved and started taking some spontaneous breathing efforts. When patient is taking spontaneous breathing at a regular interval with a normal rate, patients were weaned to CPAP-PSV mode of ventilation with PS-15cm H2O.

Then, first group of patients are maintained in CPAP-PSV mode, but Pressure support is decreased gradually from 15cmH2O to 12cmH2O, then 10cmH2O, again to 8 cmH2O, patient observed Spontaneous breathing trial with CPAP-PSV mode with pressure support of 8cmH2O, analysed with hemodynamic monitoring and ABG, patient is extubated.

In the second group , patients changed from CPAP-PSV with Pressure support 15cm H2O to Spontaneous breathing trial with T-Piece with 6 Litres of O2/min, then the patient observed analysed with hemodynamic monitoring and ABG, patient is extubated.

Both the groups were compared

CONTINUOUS EPIDURAL INFUSION PUMP



Ethical Committee Approval

↓

Patient Satisfying Inclusion Criteria

↓

Informed Consent Obtained

↓

Randomization by Closed Envelope Method

↓

Patient received in PACU from OT in paralysed state

↓

Connected to Mechanical Ventilator in VcACMV Mode

↓

Weaned to VcSIMV mode

↓

Weaned to CPAP with PS 15cm H_2O

↙ ↘

CPAP with PSV 10cm H_2O & 8cm H_2O	T Piece ventilation with 6 Ltr of O_2/min

↘ ↙

Spontaneous Breathing Trial

↓

Extubation

↓

Measurement of Other Study Outcomes

↓

Data Compilation

↓

Statistical Analysis

↓

Conclusion

STATISTICAL ANALYSIS

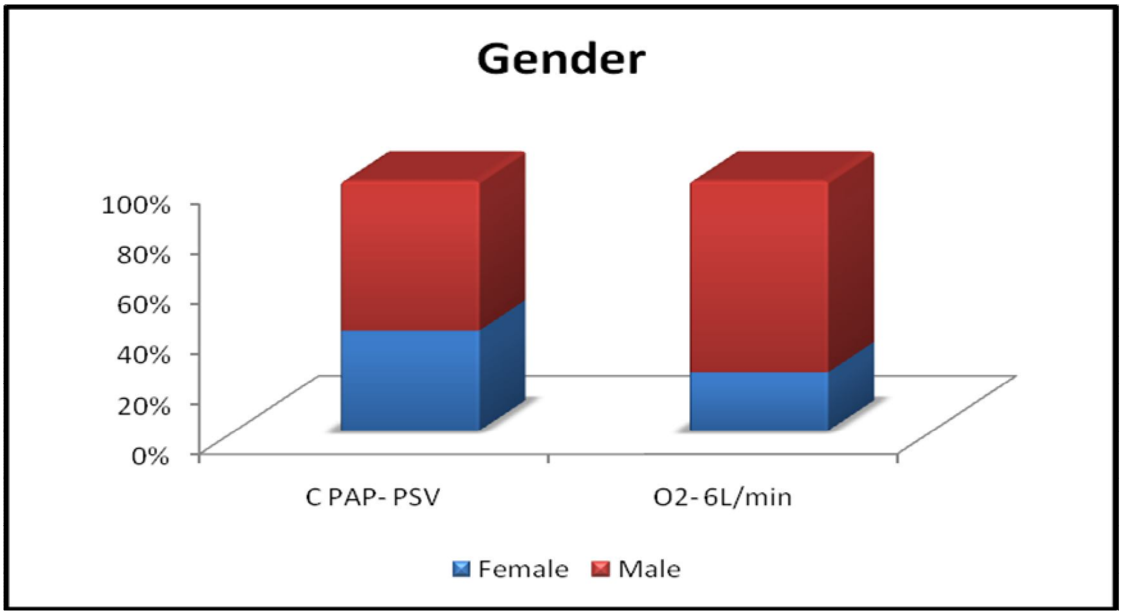
DATA ANALYSIS

The collected data were analysed with IBM.SPSS statistics software 23.0 Version.To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in Paired groups the Paired sample t-test was used & for Independent groups the Unpaired sample t-test was used. To find the significance in categorical data Chi-Square test and Fisher's Exact was used. In all the above statistical tools the probability value .05 is considered as significant level

t tests - Means: Difference between two independent means (two groups) Analysis: A priori: Compute required sample size Input: Tail(s) = Two Effect size d = 0.74 α err prob = 0.05 Power (1-β err prob) = 0.8 Allocation ratio N2/N1 = 1 Output: Noncentrality parameter δ = 2.8660077 Critical t = 2.0017175 Df = 58 Sample size group 1 = 30 Sample size group 2 = 30 Total sample size = 60 Actual power = 0.8046348

DEMOGRAPHICS

	CPAP - PSV	T-Piece with O2- 6L/min
Female	40.0%	23.3%
Male	60.0%	76.7%



Sex groups

Crosstab					
			Groups		
			CPAP-PSV	T-Piece with O2-6L/min	Total
SEX	F	Count	12	7	19
		% within Groups	40.0%	23.3%	31.7%
	M	Count	18	23	41
		% within Groups	60.0%	76.7%	68.3%
Total		Count	30	30	60
		% within Groups	100.0%	100.0%	100.0%

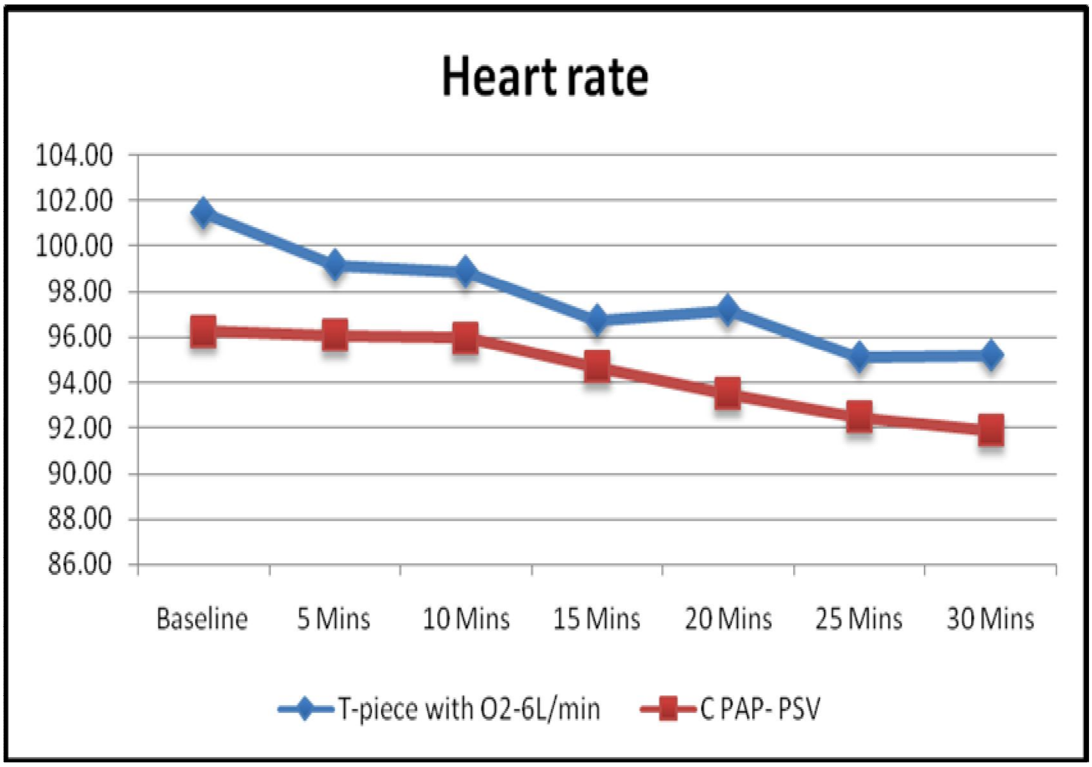
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.926[a]	1	.165		
Continuity Correction[b]	1.232	1	.267		
Likelihood Ratio	1.943	1	.163		
Fisher's Exact Test				.267	.133
N of Valid Cases	60				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.50.
b. Computed only for a 2x2 table

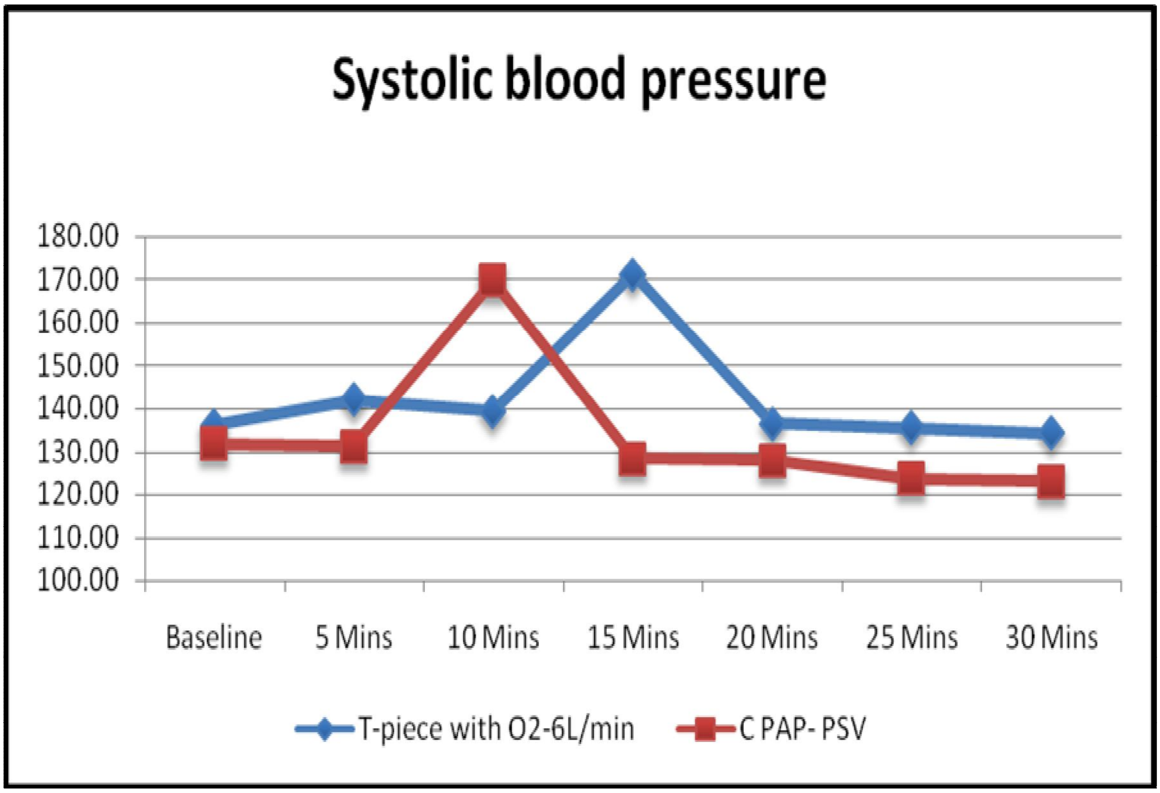
MEAN HEART RATE

	CPAP- PSV	T-piece with O2-6L/min
Baseline	96.27	101.47
5 Min	96.07	99.20
10 Min	95.97	98.90
15 Min	94.67	96.77
20 Min	93.53	97.17
25 Min	92.47	95.13
30 Min	91.90	95.23



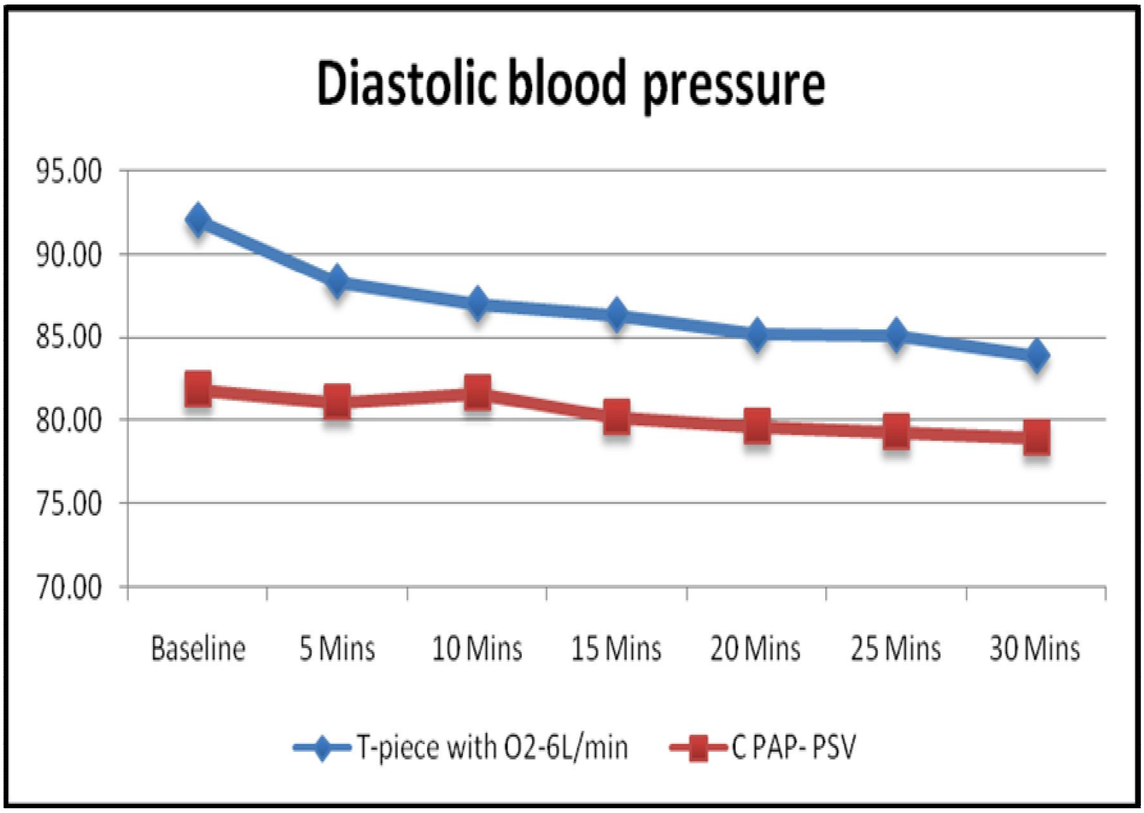
MEAN SYSTOLIC BLOOD PRESSURE

	CPAP- PSV	T-piece with O2-6L/min
Baseline	131.83	136.00
5 Min	131.13	141.90
10 Min	169.77	139.33
15 Min	128.40	171.30
20 Min	127.97	136.53
25 Min	123.67	135.43
30 Min	122.93	134.27



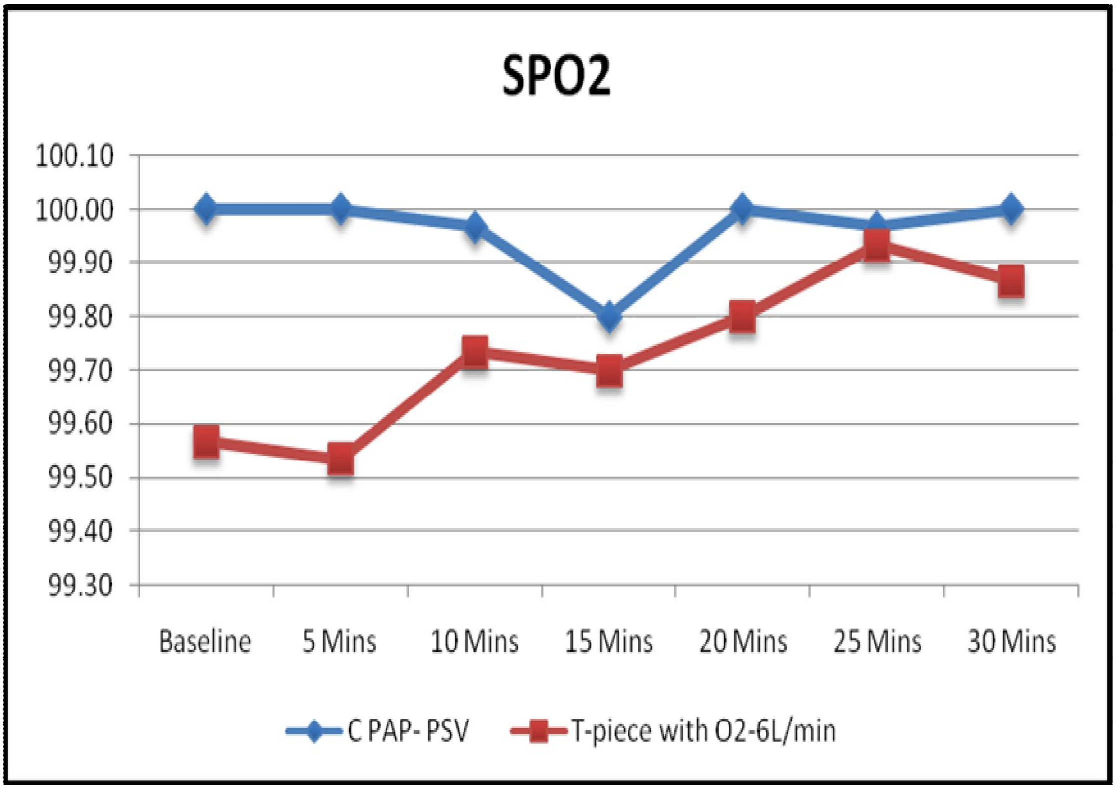
MEAN DIASTOLIC BLOOD PRESSURE

	CPAP- PSV	T-piece with O2-6L/min
Baseline	81.87	92.03
5 Min	81.13	88.40
10 Min	81.70	87.07
15 Min	80.23	86.33
20 Min	79.70	85.20
25 Min	79.37	85.10
30 Min	79.00	83.90



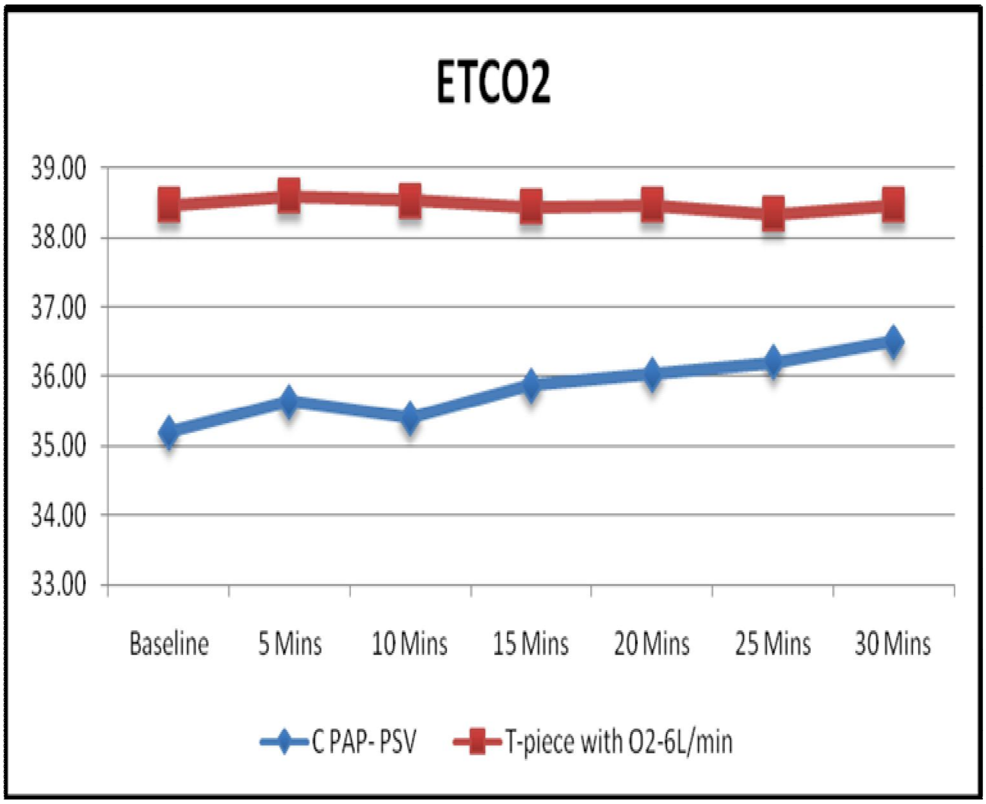
MEAN SPO2

	CPAP- PSV	T-piece with O2-6L/min
Baseline	100.00	99.57
5 Min	100.00	99.53
10 Min	99.97	99.73
15 Min	99.80	99.70
20 Min	100.00	99.80
25 Min	99.97	99.93
30 Min	100.00	99.87



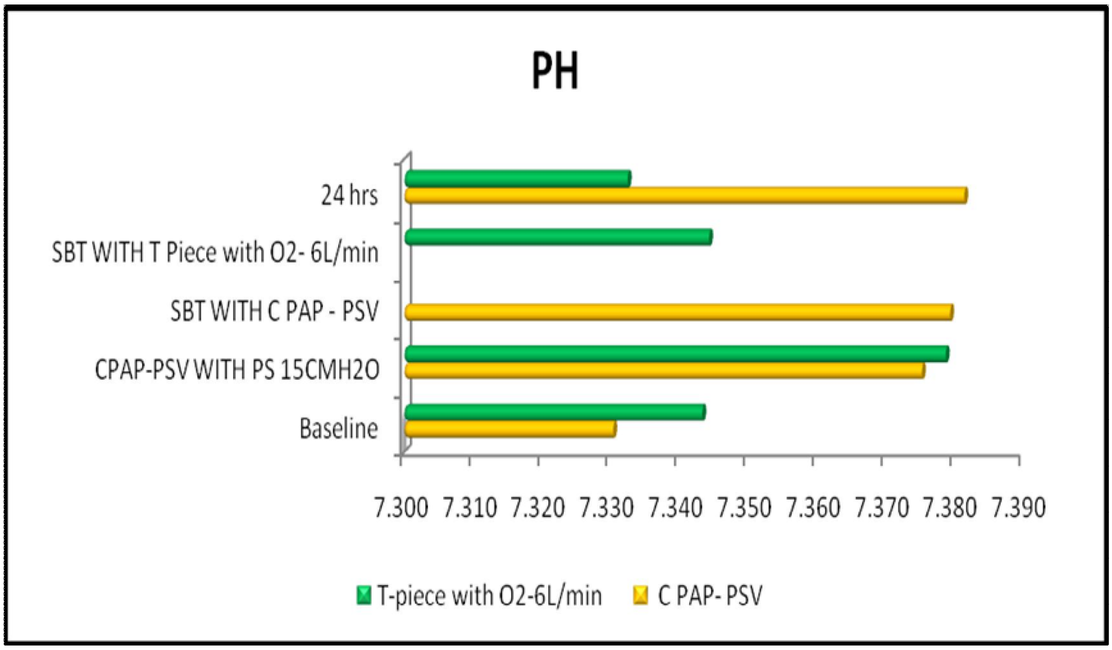
MEAN ETCO2

	CPAP- PSV	T-piece with O2-6L/min
Baseline	35.20	38.47
5 Min	35.63	38.60
10 Min	35.40	38.53
15 Min	35.87	38.43
20 Min	36.03	38.47
25 Min	36.20	38.33
30 Min	36.50	38.47



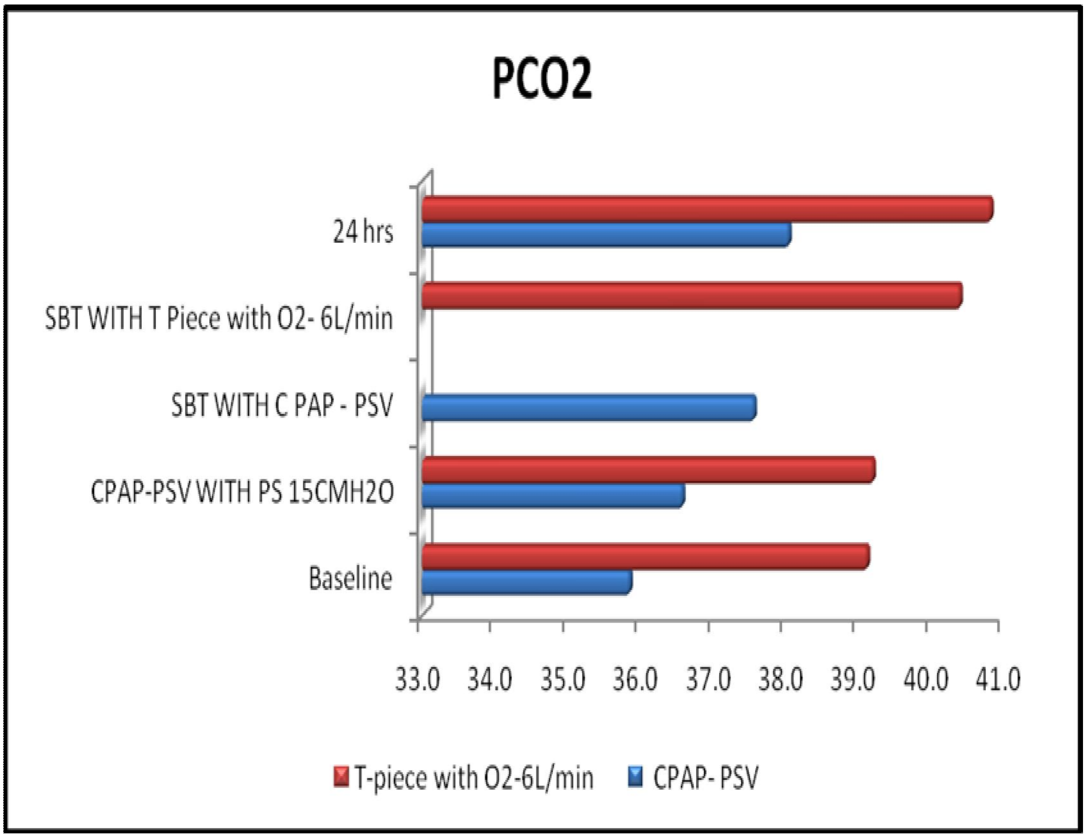
MEAN PH

	CPAP- PSV	T-piece with O2-6L/min
Baseline	7.330	7.343
CPAP-PSV WITH PS 15CMH2O	7.375	7.379
SBT WITH C PAP - PSV	7.379	
SBT WITH T Piece with O2-6L/min		7.344
24 hrs	7.382	7.333



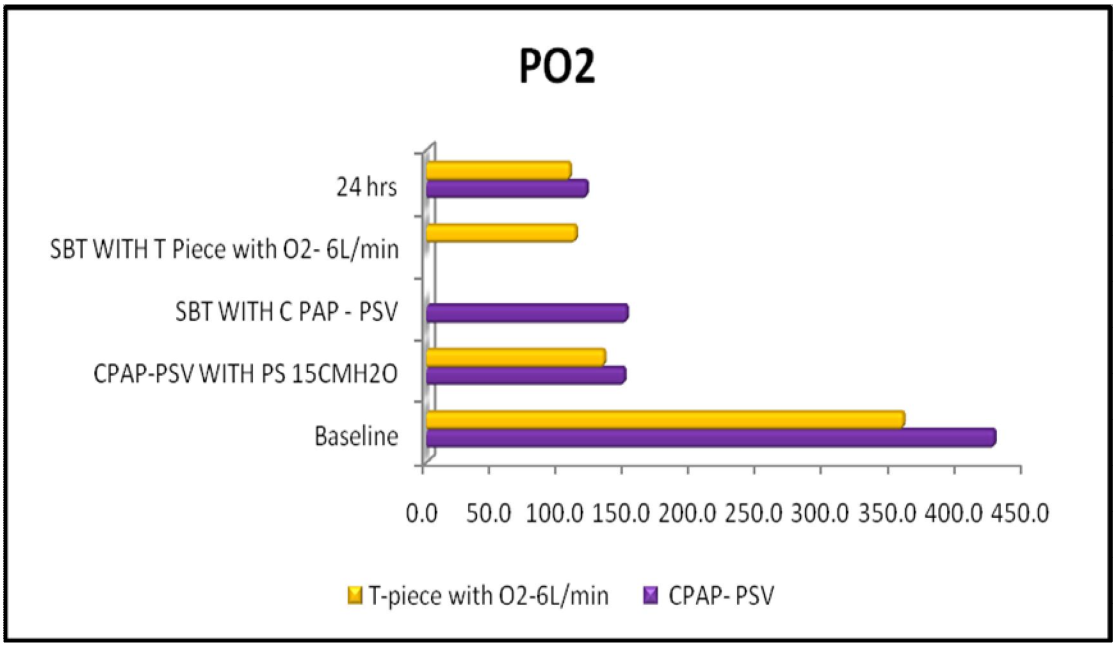
MEAN PCO2

	CPAP- PSV	T-piece with O2-6L/min
Baseline	35.9	39.1
CPAP-PSV WITH PS 15CMH2O	36.6	39.2
SBT WITH C PAP - PSV	37.6	
SBT WITH T Piece with O2- 6L/min		40.4
24 hrs	38.0	40.8



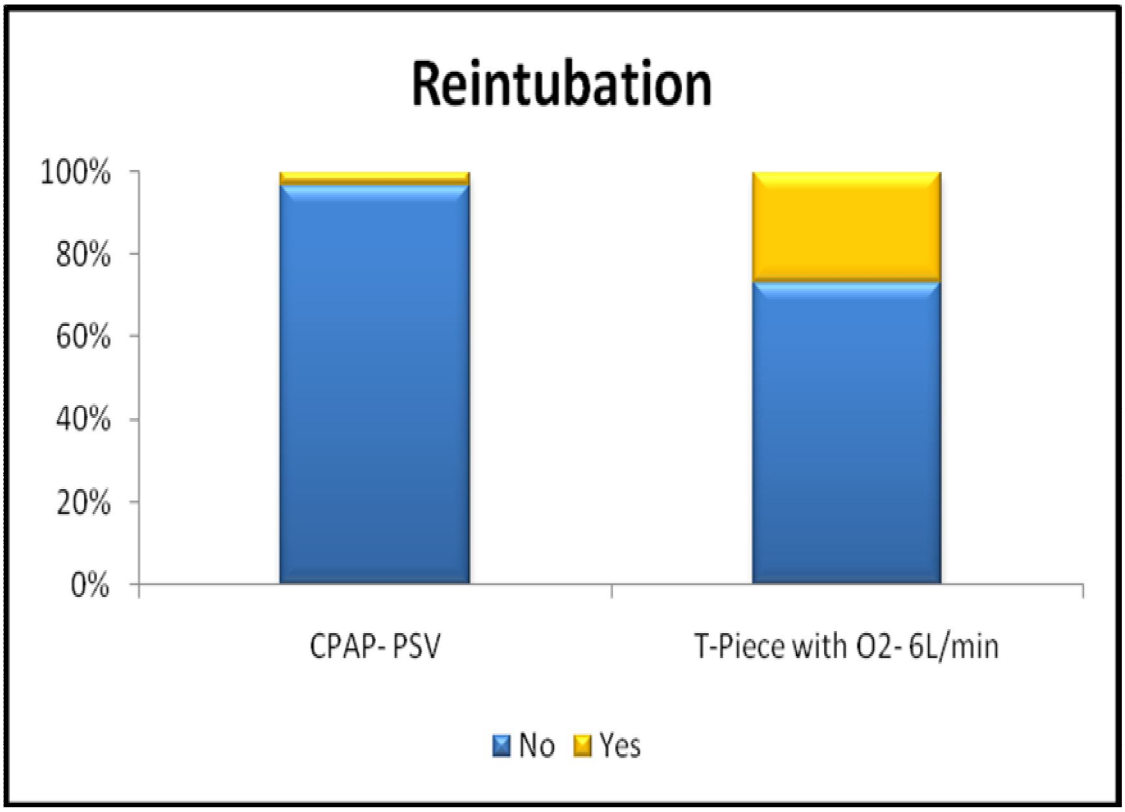
MEAN PO2

	CPAP- PSV	T-piece with O2-6L/min
Baseline	427.1	358.5
CPAP-PSV WITH PS 15CMH2O	148.7	133.5
SBT WITH CPAP - PSV	150.4	
SBT WITH T Piece with O2- 6L/min		112.1
24 hrs	120.3	107.6



RE-INTUBATION

	CPAP- PSV	T-Piece with O2-6L/min
No	96.7%	73.3%
Yes	3.3%	26.7%



Re-intubation Groups

Crosstab					
			Groups		Total
			CPAP-PSV	T-Piece with O2-6L/min	
Re-intubation	N	Count	29	22	51
		% within Groups	96.7%	73.3%	85.0%
	Y	Count	1	8	9
		% within Groups	3.3%	26.7%	15.0%
Total		Count	30	30	60
		% within Groups	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.405[a]	1	.011		
Continuity Correction[b]	4.706	1	.030		
Likelihood Ratio	7.161	1	.007		
Fisher's Exact Test				.026	.013
N of Valid Cases	60				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 4.50.
b. Computed only for a 2x2 table

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AGE	**Equal variances assumed**	.061	.806	2.270	58	.027	4.800	2.114	.568	9.032
	Equal variances not assumed			2.270	57.880	.027	4.800	2.114	.568	9.032
HR 0	**Equal variances assumed**	.434	.512	1.395	58	.168	5.200	3.727	-2.261	12.661
	Equal variances not assumed			1.395	55.592	.169	5.200	3.727	-2.268	12.668
HR5	**Equal variances assumed**	.342	.561	.944	58	.349	3.133	3.319	-3.511	9.777
	Equal variances not assumed			.944	55.979	.349	3.133	3.319	-3.516	9.782
HR10	**Equal variances assumed**	.063	.803	.909	58	.367	2.933	3.226	-3.524	9.391
	Equal variances not assumed			.909	57.187	.367	2.933	3.226	-3.526	9.393
HR15	**Equal variances assumed**	.014	.907	.652	58	.517	2.100	3.223	-4.352	8.552
	Equal variances not assumed			.652	57.992	.517	2.100	3.223	-4.352	8.552
HR20	**Equal variances assumed**	.064	.801	1.207	58	.232	3.633	3.011	-2.394	9.661
	Equal variances not assumed			1.207	57.391	.233	3.633	3.011	-2.395	9.662

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
HR25	**Equal variances assumed**	**.146**	**.703**	**.913**	**58**	**.365**	**2.667**	**2.921**	**-3.180**	**8.514**
	Equal variances not assumed			**.913**	**56.736**	**.365**	**2.667**	**2.921**	**-3.183**	**8.516**
HR30	**Equal variances assumed**	**.012**	**.914**	**1.181**	**58**	**.243**	**3.333**	**2.824**	**-2.319**	**8.985**
	Equal variances not assumed			**1.181**	**56.263**	**.243**	**3.333**	**2.824**	**-2.322**	**8.989**
SBP0	**Equal variances assumed**	**9.952**	**.003**	**.821**	**58**	**.415**	**4.167**	**5.076**	**-5.994**	**14.327**
	Equal variances not assumed			**.821**	**41.986**	**.416**	**4.167**	**5.076**	**-6.077**	**14.411**
SBP5	**Equal variances assumed**	**1.535**	**.220**	**2.812**	**58**	**.007**	**10.767**	**3.829**	**3.102**	**18.431**
	Equal variances not assumed			**2.812**	**47.995**	**.007**	**10.767**	**3.829**	**3.068**	**18.465**
SBP10	**Equal variances assumed**	**3.080**	**.085**	**-.754**	**58**	**.454**	**-30.433**	**40.376**	**-111.255**	**50.388**
	Equal variances not assumed			**-.754**	**29.377**	**.457**	**-30.433**	**40.376**	**-112.966**	**52.099**
SBP15	**Equal variances assumed**	**3.689**	**.060**	**1.283**	**58**	**.205**	**42.900**	**33.436**	**-24.030**	**109.830**
	Equal variances not assumed			**1.283**	**29.145**	**.210**	**42.900**	**33.436**	**-25.470**	**111.270**
SBP20	**Equal variances assumed**	**1.217**	**.275**	**2.753**	**58**	**.008**	**8.567**	**3.111**	**2.338**	**14.795**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
	Equal variances not assumed			2.753	51.653	.008	8.567	3.111	2.322	14.811
SBP25	Equal variances assumed	3.230	.078	-.767	58	.446	-28.233	36.823	-101.943	45.477
	Equal variances not assumed			-.767	29.288	.449	-28.233	36.823	-103.513	47.047
SBP30	Equal variances assumed	3.312	.074	-.779	58	.439	-28.667	36.794	-102.317	44.984
	Equal variances not assumed			-.779	29.269	.442	-28.667	36.794	-103.888	46.555
DBP0	Equal variances assumed	.054	.817	3.577	58	.001	10.167	2.842	4.477	15.856
	Equal variances not assumed			3.577	56.066	.001	10.167	2.842	4.473	15.860
DBP5	Equal variances assumed	.030	.862	2.753	58	.008	7.267	2.639	1.983	12.550
	Equal variances not assumed			2.753	57.373	.008	7.267	2.639	1.982	12.551
DBP10	Equal variances assumed	.000	.990	2.076	58	.042	5.367	2.585	.192	10.541
	Equal variances not assumed			2.076	57.410	.042	5.367	2.585	.191	10.543
DBP15	Equal variances assumed	.087	.769	2.248	58	.028	6.100	2.714	.667	11.533
	Equal variances			2.248	56.639	.029	6.100	2.714	.665	11.535

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
	not assumed									
DBP20	Equal variances assumed	.002	.962	2.240	58	.029	5.500	2.455	.585	10.415
	Equal variances not assumed			2.240	57.912	.029	5.500	2.455	.585	10.415
DBP25	Equal variances assumed	.094	.760	2.456	58	.017	5.733	2.334	1.061	10.405
	Equal variances not assumed			2.456	57.068	.017	5.733	2.334	1.060	10.407
DBP30	Equal variances assumed	.152	.698	2.217	58	.031	4.900	2.210	.475	9.325
	Equal variances not assumed			2.217	55.644	.031	4.900	2.210	.471	9.329
SPO20	Equal variances assumed	48.480	.000	2.904	58	.005	.433	.149	.135	.732
	Equal variances not assumed			2.904	29.000	.007	.433	.149	.128	.738
SPO25	Equal variances assumed	36.796	.000	2.626	58	.011	.467	.178	.111	.822
	Equal variances not assumed			2.626	29.000	.014	.467	.178	.103	.830
SPO210	Equal variances assumed	21.753	.000	2.091	58	.041	.233	.112	.010	.457
	Equal variances not assumed			2.091	34.628	.044	.233	.112	.007	.460

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SPO215	**Equal variances assumed**	**4.284**	**.043**	**1.001**	**58**	**.321**	**330.267**	**330.001**	**-330.302**	**990.836**
	Equal variances not assumed			**1.001**	**29.000**	**.325**	**330.267**	**330.001**	**-344.662**	**1005.195**
SPO220	**Equal variances assumed**	**27.885**	**.000**	**2.262**	**58**	**.027**	**.200**	**.088**	**.023**	**.377**
	Equal variances not assumed			**2.262**	**29.000**	**.031**	**.200**	**.088**	**.019**	**.381**
SPO225	**Equal variances assumed**	**1.396**	**.242**	**.584**	**58**	**.561**	**.033**	**.057**	**-.081**	**.148**
	Equal variances not assumed			**.584**	**52.684**	**.562**	**.033**	**.057**	**-.081**	**.148**
SPO230	**Equal variances assumed**	**13.404**	**.001**	**1.682**	**58**	**.098**	**.133**	**.079**	**-.025**	**.292**
	Equal variances not assumed			**1.682**	**29.000**	**.103**	**.133**	**.079**	**-.029**	**.295**
ETCO20	**Equal variances assumed**	**3.440**	**.069**	**-2.948**	**58**	**.005**	**-3.267**	**1.108**	**-5.485**	**-1.049**
	Equal variances not assumed			**-2.948**	**54.725**	**.005**	**-3.267**	**1.108**	**-5.488**	**-1.046**
ETCO25	**Equal variances assumed**	**.745**	**.392**	**-2.680**	**58**	**.010**	**-2.967**	**1.107**	**-5.183**	**-.751**
	Equal variances not assumed			**-2.680**	**56.726**	**.010**	**-2.967**	**1.107**	**-5.184**	**-.750**
ETCO210	**Equal variances**	**.667**	**.417**	**-2.988**	**58**	**.004**	**-3.133**	**1.049**	**-5.232**	**-1.034**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
	assumed									
	Equal variances not assumed			-2.988	57.076	.004	-3.133	1.049	-5.233	-1.034
ETCO215	Equal variances assumed	.968	.329	-2.763	58	.008	-2.567	.929	-4.426	-.707
	Equal variances not assumed			-2.763	57.140	.008	-2.567	.929	-4.427	-.706
ETCO220	Equal variances assumed	.096	.758	-2.772	58	.007	-2.433	.878	-4.191	-.676
	Equal variances not assumed			-2.772	57.710	.007	-2.433	.878	-4.191	-.676
ETCO225	Equal variances assumed	.296	.588	-2.670	58	.010	-2.133	.799	-3.733	-.534
	Equal variances not assumed			-2.670	57.189	.010	-2.133	.799	-3.733	-.533
ETCO230	Equal variances assumed	.044	.835	-2.499	58	.015	-1.967	.787	-3.542	-.391
	Equal variances not assumed			-2.499	57.885	.015	-1.967	.787	-3.542	-.391
FIO2 B	Equal variances assumed	4.291	.043	1.000	58	.321	2.000	2.000	-2.003	6.003
	Equal variances not assumed			1.000	29.000	.326	2.000	2.000	-2.090	6.090
PH B	Equal variances assumed	1.619	.208	-2.629	58	.011	-.043667	.016609	-.076912	-.010421

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
	Equal variances not assumed			-2.629	51.429	.011	-.043667	.016609	-.077003	-.010330
PCO2 B	Equal variances assumed	2.980	.090	-2.524	58	.014	-3.2733	1.2968	-5.8692	-.6774
	Equal variances not assumed			-2.524	53.749	.015	-3.2733	1.2968	-5.8736	-.6731
PO2 B	Equal variances assumed	2.914	.093	3.726	58	.000	68.600	18.412	31.744	105.456
	Equal variances not assumed			3.726	55.096	.000	68.600	18.412	31.702	105.498
PH CPAP-PSV WITH PS 15CMH2O	Equal variances assumed	7.171	.010	-.339	58	.736	-.003467	.010234	-.023952	.017019
	Equal variances not assumed			-.339	45.917	.736	-.003467	.010234	-.024067	.017134
PCO2 CPAP-PSV WITH PS 15CMH2O	Equal variances assumed	20.768	.000	-2.725	58	.008	-2.6267	.9641	-4.5565	-.6968
	Equal variances not assumed			-2.725	37.726	.010	-2.6267	.9641	-4.5788	-.6745
PO2 CPAP-PSV WITH PS 15CMH2O	Equal variances assumed	.015	.904	3.483	58	.001	15.233	4.373	6.480	23.987
	Equal variances not assumed			3.483	56.291	.001	15.233	4.373	6.474	23.993
FIO2 24	Equal variances assumed	31.605	.000	-2.344	58	.023	-3.80000	1.62110	-7.04499	-.55501
	Equal variances			-2.344	39.119	.024	-3.80000	1.62110	-7.07867	-.52133

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
	not assumed									
PH 24	**Equal variances assumed**	**.381**	**.540**	**.531**	**58**	**.597**	**.003967**	**.007469**	**-.010984**	**.018918**
	Equal variances not assumed			**.531**	**55.903**	**.597**	**.003967**	**.007469**	**-.010996**	**.018930**
PCO2 24	**Equal variances assumed**	**2.860**	**.096**	**-3.321**	**58**	**.002**	**-2.7800**	**.8371**	**-4.4555**	**-1.1045**
	Equal variances not assumed			**-3.321**	**55.740**	**.002**	**-2.7800**	**.8371**	**-4.4570**	**-1.1030**
PO2 24	**Equal variances assumed**	**1.928**	**.170**	**4.116**	**58**	**.000**	**12.700**	**3.085**	**6.524**	**18.876**
	Equal variances not assumed			**4.116**	**55.044**	**.000**	**12.700**	**3.085**	**6.517**	**18.883**
Duration of MV	**Equal variances assumed**	**3.159**	**.081**	**-3.980**	**58**	**.000**	**-386.700**	**97.150**	**-581.168**	**-192.232**
	Equal variances not assumed			**-3.980**	**46.078**	**.000**	**-386.700**	**97.150**	**-582.245**	**-191.155**

GROUP STATISTICS

Groups		N	Mean	Std. Deviation	Std. Error Mean
AGE	C PAP- PSV	30	51.63	8.373	1.529
	T-Piece	30	46.83	8.000	1.461
HR 0	T-Piece	30	101.47	15.867	2.897
	C PAP- PSV	30	96.27	12.846	2.345
HR5	T-Piece	30	99.20	14.023	2.560
	C PAP- PSV	30	96.07	11.570	2.112
HR10	T-Piece	30	98.90	13.218	2.413
	C PAP- PSV	30	95.97	11.725	2.141
HR15	T-Piece	30	96.77	12.555	2.292
	C PAP- PSV	30	94.67	12.411	2.266
HR20	T-Piece	30	97.17	12.248	2.236
	C PAP- PSV	30	93.53	11.045	2.016
HR25	T-Piece	30	95.13	12.128	2.214
	C PAP- PSV	30	92.47	10.434	1.905
HR30	T-Piece	30	95.23	11.857	2.165
	C PAP- PSV	30	91.90	9.929	1.813
SBP0	T-Piece	30	136.00	25.003	4.565
	C PAP- PSV	30	131.83	12.157	2.220
SBP5	T-Piece	30	141.90	17.897	3.268
	C PAP- PSV	30	131.13	10.932	1.996
SBP10	T-Piece	30	139.33	17.773	3.245
	C PAP- PSV	30	169.77	220.433	40.245
SBP15	T-Piece	30	171.30	182.909	33.395
	C PAP- PSV	30	128.40	9.160	1.672
SBP20	T-Piece	30	136.53	14.004	2.557
	C PAP- PSV	30	127.97	9.711	1.773
SBP25	T-Piece	30	135.43	14.178	2.589
	C PAP- PSV	30	123.67	9.102	36.732
SBP30	T-Piece	30	134.27	13.696	2.501
	C PAP- PSV	30	122.93	9.078	36.709
DBP0	T-Piece	30	92.03	11.987	2.189
	C PAP- PSV	30	81.87	9.933	1.814
DBP5	T-Piece	30	88.40	10.743	1.961
	C PAP- PSV	30	81.13	9.673	1.766

Groups		N	Mean	Std. Deviation	Std. Error Mean
DBP10	T-Piece	30	87.07	10.508	1.918
	C PAP- PSV	30	81.70	9.491	1.733
DBP15	T-Piece	30	86.33	11.296	2.062
	C PAP- PSV	30	80.23	9.662	1.764
DBP20	T-Piece	30	85.20	9.693	1.770
	C PAP- PSV	30	79.70	9.322	1.702
DBP25	T-Piece	30	85.10	9.600	1.753
	C PAP- PSV	30	79.37	8.442	1.541
DBP30	T-Piece	30	83.90	9.400	1.716
	C PAP- PSV	30	79.00	7.629	1.393
SPO20	C PAP- PSV	30	100.00	0.000	0.000
	T-Piece	30	99.57	.817	.149
SPO25	C PAP- PSV	30	100.00	0.000	0.000
	T-Piece	30	99.53	.973	.178
SPO210	C PAP- PSV	30	99.97	.183	.033
	T-Piece	30	99.73	.583	.106
SPO215	C PAP- PSV	30	99.80	0.484	0.088
	T-Piece	30	99.70	.651	.119
SPO220	C PAP- PSV	30	100.00	0.000	0.000
	T-Piece	30	99.80	.484	.088
SPO225	C PAP- PSV	30	99.97	.183	.033
	T-Piece	30	99.93	.254	.046
SPO230	C PAP- PSV	30	100.00	0.000	0.000
	T-Piece	30	99.87	.434	.079
ETCO20	C PAP- PSV	30	35.20	4.788	.874
	T-Piece	30	38.47	3.730	.681
ETCO25	C PAP- PSV	30	35.63	4.597	.839
	T-Piece	30	38.60	3.953	.722
ETCO210	C PAP- PSV	30	35.40	4.312	.787
	T-Piece	30	38.53	3.794	.693
ETCO215	C PAP- PSV	30	35.87	3.812	.696
	T-Piece	30	38.43	3.370	.615
ETCO220	C PAP- PSV	30	36.03	3.518	.642
	T-Piece	30	38.47	3.277	.598
ETCO225	C PAP- PSV	30	36.20	3.274	.598
	T-Piece	30	38.33	2.905	.530
ETCO230	C PAP- PSV	30	36.50	3.116	.569
	T-Piece	30	38.47	2.980	.544

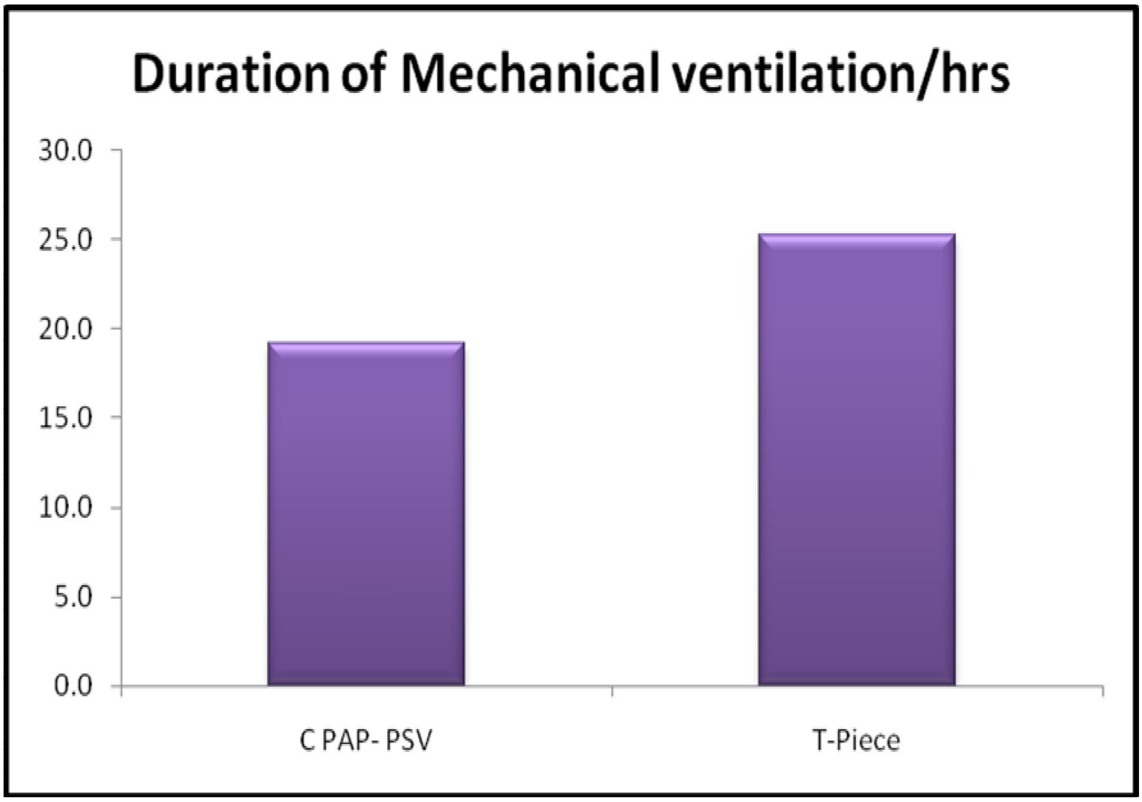
Groups		N	Mean	Std. Deviation	Std. Error Mean
FIO2 B	C PAP-PSV	30	100.00	0.000	0.000
	T-Piece	30	98.00	10.954	2.000
PH B	C PAP-PSV	30	7.33047	.074944	.013683
	T-Piece	30	7.37413	.051563	.009414
PCO2 B	C PAP-PSV	30	35.853	5.6852	1.0380
	T-Piece	30	39.127	4.2582	.7774
PO2 B	C PAP-PSV	30	427.13	62.592	11.428
	T-Piece	30	358.53	79.074	14.437
FIO2 CPAP-PSV WITH PS 15CMH2O	C PAP-PSV	30	40.000	.0000[a]	0.0000
	T-Piece	30	40.000	.0000[a]	0.0000
PH CPAP-PSV WITH PS 15CMH2O	C PAP-PSV	30	7.37537	.048753	.008901
	T-Piece	30	7.37883	.027661	.005050
PCO2 CPAP-PSV WITH PS 15CMH2O	C PAP-PSV	30	36.580	4.9155	.8974
	T-Piece	30	39.207	1.9291	.3522
PO2 CPAP-PSV WITH PS 15CMH2O	C PAP-PSV	30	148.70	18.353	3.351
	T-Piece	30	133.47	15.391	2.810
FIO2 24	C PAP-PSV	30	21.6333	3.46891	.63333
	T-Piece	30	25.4333	8.17348	1.49227
PH 24	C PAP-PSV	30	7.38153	.025976	.004743
	T-Piece	30	7.37757	.031605	.005770
PCO2 24	C PAP-PSV	30	38.047	3.5533	.6487
	T-Piece	30	40.827	2.8972	.5290

Groups		N	Mean	Std. Deviation	Std. Error Mean
PO2 24	C PAP-PSV	30	120.30	13.262	2.421
	T-Piece	30	107.60	10.474	1.912
Duration of MV	C PAP-PSV	30	19.2	4.390	
	T-Piece	30	25.3	8.100	

a. t cannot be computed because the standard deviations of both groups are 0.

DURATION OF MECHANICAL VENTILATION

Groups		N	Mean	Std. Deviation	Std. Error Mean
Duration of MV	C PAP- PSV	30	19.2	9.67665	
	T-Piece	30	25.3	18.100	



Descriptive

Groups = CPAP- PSV

Descriptive Statistics[a]

	N	Minimum	Maximum	Mean	Std. Deviation
FIO2 SBT WITH C PAP - PSV	30	40.0	40.0	40.000	0.0000
PH SBT WITH C PAP - PSV	30	7.361	7.450	7.41947	.034567
PCO2 SBT WITH C PAP - PSV	30	37.1	44.86	41.567	4.7324
PO2 SBT WITH C PAP - PSV	30	125	193	150.43	9.195

a. Groups = C PAP- PSV

Descriptive Statistics[a]

Groups = T-Piece with O2- 6L/min

	N	Minimum	Maximum	Mean	Std. Deviation
FIO2 SBT WITH T Piece with O2- 6L/min	30	28.00	28.00	28.0000	0.00000
PH SBT WITH T Piece with O2- 6L/min	30	7.322	7.432	7.36940	12.16714
PCO2 SBT WITH T Piece with O2- 6L/min	30	33.40	49.10	46.4033	9.67665
PO2 SBT WITH T Piece with O2- 6L/min	30	82	126	112.07	16.858
a. Groups = T-piece with O2- 6L/min					

DISCUSSION

A prospective randomised controlled study to compare the efficacy and safety of Weaning of adult patients by T piece ventilation and pressure support ventilation in PACU who have undergone elective upper abdominal surgeries

CPAP-PSV :

It is **PEEP** applied to the airway of the ***Spontaneously breathing*** patients. Pressure support ventilation is used to reduce the elastic and non elastic airflow resistance, to augment the spontaneous tidal volume. Resulting spontaneous tidal volume is directly proportional to the pressure support level. It helps in improving oxygenation in patients with refractory hypoxemia and a low FRC. CPAP settings are adjusted to provide the better oxygenation with the lowest positive pressure and the lowest FiO2

Advantages :

- Ventilator can monitor the patient's breathing and activate an alarm if something undesirable occurs

T-piece with O_2 - 6L/min

T-piece assist in weaning a patient from ventilator. T Piece deliver humidified oxygen to a long term ventilated patient who is being weaned from ventilator. In T piece inhaled gas is delivered at a high flow rate

In our study the demographic profile was comparable with the respective mean age, body weight and ASA physical status. Patients were randomised into two groups, group-A weaned and extubated after CPAP-PSV and group-B weaned and extubated after T-piece with O_2-6L/min. Hemodynamic parameters like heart rate, systolic, diastolic blood pressure, $EtCO_2$, ABG, time to wean, extubation failure, Reintubation, were monitored.

1. Patients in group-A have a stable heart rate compared with group – B having increased in heart rate in the process of weaning and observation during post extubation period for 24 hrs. This difference in diastolic blood or 24 hrs. This difference in heart rate between the two groups was statistically significant($p<0.05$).

2. Patients in group-A have a normal range of systolic blood pressure compared with group-B having increased systolic blood pressure during weaning from ventilator and observation during post

extubation period for 24 hrs. This difference in systolic blood pressure between the two groups was statistically significant($p<0.05$).

3. Patients in group-A have a normal range of diastolic blood pressure compared with group-B having increased diastolic blood pressure during weaning from ventilator and observation during extubation period for 24 hrs. This difference in systolic blood pressure between the two groups was statistically significant($p<0.05$).

4. Patients in group-A have a good saturation (>99%)compared with group-B having low saturation (<99%) during weaning from ventilator and observation during post extubation period for 24 hrs. This difference in saturation between the two groups was statistically significant($p<0.05$).

5. Patients in group-A have a normal range of ETCO2 compared with group-B having increased ETCO2 during weaning from ventilator and observation during post extubation period for 24 hrs. This difference in ETCO2 between the two groups was statistically significant($p<0.05$).

6. Patients in group-A have a less spontaneous breathing trial failure compared with group-B having high spontaneous breathing trial failure during weaning from ventilator . This difference in

spontaneous breathing trial failure between the two groups was statistically significant($p<0.05$).

7. Patients in group-A have a normal range of PH compared with group-B moving towards acidotic side during weaning from ventilator and observation during post extubation period for 24 hrs. The results were Mean PH in group A was 7.41947 with SD of 0.034567 and in group B mean PH was 7.36940 with SD of 12.09 which was found to be statistically significant.This difference in PH between the two groups was statistically significant($p<0.05$)

8. Patients in group-A have a normal range of PaO2 compared with group-B having decreased PaO2 during weaning from ventilator and observation during post extubation period for 24 hrs. The results were Mean PaO2 in group A was 150.43 with SD of 9.195and in group B mean PaO2 was 112.07 with SD of 16.858 which was found to be statistically significant. This difference in PaO2 between the two groups was statistically significant($p<0.05$)

9. Patients in group-A have a normal range of PaCO2 compared with group-B having increased PaCO2 during weaning from ventilator and observation during post extubation period for 24 hrs. The results were Mean PaCO2 in group A was 41.5667 with SD of 4.7324and in group

B mean PaCO2 was 46.4033 with SD of 9.67665 which was found to be statistically significant This difference in PaCO2 between the two groups was statistically significant($p<0.05$)

10. Patients in group-A have less duration of mechanical ventilation and had early extubation compared with group-B having increased duration of mechanical ventilation and delayed extubation. The results were Mean duration of MV in group A was 19.2 hours with SD of 9.67665 and in group B mean PH was 25.3 hours SD of 18.100 which was found to be statistically significant. This difference in duration of mechanical ventilation between the two groups was statistically significant($p<0.05$)

11. Patients in group-A have a very less incidence of Reintubation compared with group-B having increased incidence of Reintubation during post extubation period for 24 hrs. The results were Mean reintubation in group A was 3.3% with SD 3.561 and in group B mean reitubation was 26.6% with SD 17.2234 which was found to be statistically significant This difference in Reintubation between the two groups was statistically significant($p<0.05$)

SUMMARY

Weaning is a process of withdrawing mechanical ventilator support and transferring work of breathing from mechanical ventilator to patient.

This study was conducted to evaluate the effectiveness and safety of two strategies, a pressure support ventilation (PSV) and spontaneous breathing trial with T piece, for weaning adult patients undergone upper abdominal surgeries who required post operative elective mechanical ventilation for at least 12 hours, measuring weaning success and other clinically important outcomes.

The following observations were made:

- Mean heart rate was lower in PSV group than T piece group which was statistically significant.
- Mean systolic blood pressure was lower in PSV group than T piece group which was statistically significant.
- Mean diastolic blood pressure was lower in PSV group than T piece group which was statistically significant.
- Mean SPO2 was better in PSV group than T piece group which was statistically significant.

- Mean ETCO2 was lower in PSV group than T piece group which was statistically significant.
- Mean PH was better in PSV group than T piece group which was statistically significant.
- Mean PaO2 was higher in PSV group than T piece group which was statistically significant.
- Mean PaCO2 was lower in PSV group than T piece group which was statistically significant.
- Mean duration of Mechanical ventilation was lower in PSV group than T piece group which was statistically significant.
- Reintubation was lower in PSV group than T piece group which was statistically significant.

CONCLUSION

From my study, I conclude that weaning the patients from mechanical ventilator who have undergone upper abdominal surgeries can be done by Pressure support ventilation or by T piece with O_2-6L/min. Considering the better hemodynamic stability, gas analysis, less duration of mechanical ventilation, lesser incidence of reintubation, I conclude pressure support ventilation is superior in weaning the patient from mechanical ventilator than T-piece ventilation

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INSTITUTUIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI 600 003

EC Reg.No.ECR/270/Inst./TN/2013
Telephone No.044 25305301
Fax: 011 25363970

CERTIFICATE OF APPROVAL

MADRAS MEDICAL COLLEGE
15 MAR 2017
CHENNAI-600 003

To
Dr.Gopinath.A
II Year Post Graduate in MD Anaesthesiology
Institute of Anaesthesiology & Critical Care
Madras Medical College
Chennai 600 003

Dear Dr.Gopinath.A,

The Institutional Ethics Committee has considered your request and approved your study titled "**PRESSURE SUPPORT VERSUS SPONTANEOUS BREATHING TRIAL WITH 'T' PIECE FOR WEANING FROM MECHANICAL VENTILATION IN ADULTS IN POST ANAESTHESIA CARE UNIT (PACU)" - NO.09022017 (II)**

The following members of Ethics Committee were present in the meeting hold on **21.02.2017** conducted at Madras Medical College, Chennai 3

1.Dr.C.Rajendran, MD.,	:Chairperson
2.Dr.M.K.Muralidharan,MS.,M.Ch.,Dean, MMC,Ch-3	:Deputy Chairperson
3.Prof.Sudha Seshayyan,MD., Vice Principal,MMC,Ch-3	: Member Secretary
4.Prof.B.Vasanthi,MD., Prof.of Pharmacology.,MMC,Ch-3	: Member
5.Prof.K.Ramadevi,MD.,Director,Inst.of Bio-Che,MMC,Ch-3	: Member
6.Tmt.J.Rajalakshmi, JAO,MMC, Ch-3	: Lay Person
7.Thiru S.Govindasamy, BA.,BL,High Court,Chennai	: Lawyer
8.Tmt.Arnold Saulina, MA.,MSW.,	:Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

14/3/17

Member Secretary – Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

ANNEXURES

PROFORMA

Date	:	
Name	:	
Age/Sex	:	
IP No	:	
Diagnosis	:	
Surgical Procedure Done	:	
Co morbid Illness	:	
Duration of Surgery	:	
Reason for EPOV	:	

Patient received in PACU and connected to VcACMV

Events/ Time (min)	**0**	**5**	**10**	**15**	**20**	**25**	**30**
HR							
SBP							
DBP							
SPO_2							
$ETCO_2$							

Baseline Gas Changes after connecting to Ventilator with FIO_2–100%

PH	**PCO_2**	**HCO_3^-**	**PO_2**	**SO_2**

Gas values in CPAP with PSV 15cm of H_2O

PH	**PCO_2**	**HCO_3^-**	**PO_2**	**SO_2**

SPONTANEOUS BREATHING TRIAL

Comparison of CPAP–PSV and 'T' Piece Ventilation

Events/ Time (min)	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**
HR													
SBP													
DBP													
SPO_2													
RR													
P^H													
PO_2													
PCO_2													

POST EXTUBATION MONITORING

Comparison of CPAP–PSV and 'T' Piece Ventilation

Events / Time	**5 min**	**10 min**	**15 min**	**20 min**	**25 min**	**30 min**	**1 Hr**	**2 Hrs**	**4 Hrs**	**8 Hrs**	**12 Hrs**	**24 Hrs**
HR												
SBP												
DBP												
SPO_2												
RR												
P^H												
PO_2												
PCO_2												

INFORMATION TO PARTICIPANTS

Investigator **:** Dr. Gopinath.A

Name of the Participant:

Title. “**Pressure support versus spontaneous breathing trial with ‘T’ piece for weaning from mechanical ventilation in adults in Post anaesthesia care unit(PACU)”**.

(A Prospective, randomized study for evaluating the effectiveness and safety of two strategies, a pressure support ventilation (PSV) and ‘T’ tube ventilation for weaning adult patients)

You are invited to take part in this research study. We have got approval from the IEC. You are asked to participate because you satisfy the eligibility criteria. We want to evaluate the effectiveness and safety of two strategies, a pressure support ventilation (PSV) and ‘T’ tube ventilation for weaning adult patients that required mechanical ventilation for at least 12 hours, measuring weaning success and other clinically important outcomes.

What is the Purpose of the Research:

For Mechanically ventilated patients, in PACU, pressure support and T-Piece ventilation are compared for weaning and to study

1. Total duration of MV (days or hours).
2. Time of weaning from MV or weaning duration
3. Hemodynamic & Biochemical changes related to weaning
4. PACU- Length of stay.
5. Proportion requiring Re-intubation
6. Mortality

The Study Design:

All the patients in the study will be divided into two groups.

60 patients requiring post operative mechanical ventilation were randomly assigned to two groups .

GroupA-Weaning from mechanical ventilation from pressure support ventilation

Group B- Weaning from mechanical ventilation from T Piece ventilation

Benefits

PSV was more effective than a T-piece for successful spontaneous breathing trials (SBTs) and Weaning duration is shorter with pressure support ventilation comparing with T-Piece

Discomforts and risks

Extubaion failure

Chances of Re-intubation

This intervention has been shown to be well tolerated as shown by previous studies. And if you do not want to participate you will have alternative of setting the standard treatment and your safety is our prime concern.

Time :
Date :
Place :

Signature / Thumb Impression of Patient
Patient Name:

Signature of the Investigator : ______________________________

Name of the Investigator : ______________________________

PATIENT CONSENT FORM

Study title “**Pressure support versus spontaneous breathing trial with ‘T’ piece for weaning from mechanical ventilation in adults in Post anaesthesia care unit(PACU)”**.

.

(A Prospective, randomized, study for evaluating the effectiveness and safety of two strategies, a pressure support ventilation (PSV) and ‘T’ tube ventilation for weaning adult patients)

Study center: **INSTITUTE OF ANAESTHESIOLOGY AND CRITICAL CARE,**
RAJIV GANDHI GOVT. GENERAL HOSPITAL,
MADRAS MEDICAL COLLEGE,
CHENNAI-03.

Participant name: Age: Sex:
I.P.No:

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I have been explained about the pitfall in the procedure. I have been explained about the safety, advantage and disadvantage of the technique.

I understand that my participation in the study is voluntary and that I am free to withdraw at anytime without giving any reason.

I understand that investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both in respect to current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study.

Time:

Date: Signature / thumb impression of patient

Place: Patient name:

Signature of the investigator:

Name of the investigator:

ஆராய்ச்சி ஒப்புதல் படிவம்

ஆராய்ச்சியின் தலைப்பு

மயக்கத்திற்கு பின் பராமரிப்பு பிரிவில் அழுத்த உதவியுடன் சுவாசம் (PSV) மற்றும் 'T' குழாய் சுவாசம் இவற்றின் மூலம் படிப்படியாக செயற்கை சுவாச வழங்கியில் இருந்து குறைத்து நோயாளியிடமிருந்து எண்டோட்ரக்கியல் குழாயை நீக்குதலை ஒப்பிடுதல்

ஆய்வு நிலையம் : மயக்கவியல் துறை, சென்னை மருத்துவக் கல்லூரி சென்னை - 3.

பங்கு பெறுவரின் பெயர் :

பங்குபெறுபவரின் எண் :

பங்குபெறுபவர் இதனை (✓) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நான் இவ்வாய்வில் தன்னிச்சையாகதான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக்கொள்ளவும் அதை பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கின்றேன். ☐

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன் 'இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிக்கிறேன். ☐

பங்கேற்பவரின் கையொப்பம் .... இடம்................. தேதி...............

கட்டைவிரல் ரேகை

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் ....

ஆய்வாளரின் கையொப்பம் A.J.M. .... **இடம்**................. **தேதி**................

ஆய்வாளரின் பெயர் ....டா. அ. ஜோசபின்.............................

S.NO	DATE	NAME	AGE	SEX	IP NO	DIAGNOSIS	SURGERY	Dept	RECEIVED TIME	HR							SBP					
										0	5	10	15	20	25	30	0	5	10	15	20	25
						CPAP EXTUBATION GROUP																
1	04/05/2017	kannan	40	M	27215	Aorto iliac occlusion	Aorto bifemoral bypass	VS-2	2.30 PM	130	127	122	118	116	109	112	145	138	136	137	140	134
2	04/07/2017	Devaraj	65	M	25225	CA Oesophagus	pyloroplasty& FJ	SGE-2	1.35 PM	121	108	109	110	107	108	110	159	145	147	142	138	132
3	04/10/2017	Jayakumar	67	M	30224	Aorto iliac occlusion	Aorto bifemoral bypass	VS-1	4.45 PM	120	112	118	104	99	101	103	185	190	192	187	180	177
4	04/10/2017	Fathima	42	F	29526	Cholelithiasis	Open cholecystectomy	S-2	1.30 PM	108	104	106	87	98	94	99	139	142	134	132	140	131
5	04/11/2017	Chellamuthu	65	M	24918	Periampullary Carcinoma	Whipples procedure with FJ	SGE-1	5.00 PM	99	102	100	94	96	93	94	144	149	137	134	140	137
6	18/4/2017	Veeramma	62	F	32817	Periampullary Carcinoma	Whipples procedure with FJ	SGE-1	6.30 PM	64	70	68	66	68	61	64	192	197	186	182	152	155
7	19/4/2017	Rajendran	50	M	34243	Aorto graft thrombosis	Thrombectomy with patch plasty	VS-2	3.45 PM	104	102	100	97	98	94	95	152	148	147	140	143	140
8	22/4/2017	Shankar	47	M	31829	Cholelithiasis	Open Cholecystectomy	S2	2.15 PM	99	101	97	95	92	97	94	142	145	139	139	137	140
9	23/4/2017	Karmegam	55	M	29877	CA Oesophagus	VATS	SGE-1	5.15 PM	117	108	109	104	107	110	108	152	146	148	144	146	144
10	26/4/2017	Parameswari	43	F	34263	CA OG junction Loc.Advanced	Ext.Total gastrectomy,Distal pancreatectomy,Splenectomy,Lt.Adr enelectomy, Cholecystectomy	SGE-2	4.30 PM	130	126	120	117	118	113	117	110	118	114	122	117	108
11	26/4/2017	Sulaiman	65	F	39843	Rt.iliac artery aneurysm extending into aortic bifurcation	Endoaneurysmo raphe with Bi iliac bypass	VS-1	5.15 PM	94	88	85	86	84	82	84	138	140	136	135	137	134
12	27/4/2017	Devaraj	40	M	39104	Recurrent hydatic cyst liver	Cyst decompression with tube cholecystectomy	SGE-1	06.00 PM	96	92	95	90	93	88	91	144	152	148	147	139	142
13	28/4/2017	Jaya	53	F	22020	CA Duodenum(Post Rt.Hemicolectomy)	Whipples procedure with FJ	SGE-1	06.30 PM	102	98	99	103	107	96	95	160	155	162	154	149	144
14	29/4/2017	Saradhamma	67	F	37317	CA Gall bladder Loc advanced	Hepaticojejunostomy to LHD	SGE-2	02.15 PM	71	68	72	67	69	70	68	106	110	113	114	110	108
15	29/4/2017	Krishnan	45	M	38863	Aorto iliac occlusion	Aorto bifemoral bypass	VS-2	04.35 PM	69	67	67	68	70	67	67	151	138	134	128	128	126
16	05/03/2017	Ravi kumar	66	M	38629	Proximal Gastric CA	Oesophageo jejunal anastomosis & FJ	SGE-2	4.55 PM	94	93	97	94	98	92	99	140	128	124	130	127	130
17	05/06/2017	Malarkodi	48	F	38265	CA OG junction	Transhiatal total gastrectomy	SGE-2	04.05 PM	94	95	98	93	93	92	95	118	109	104	107	100	99
18	05/07/2017	Suseela	54	F	35131	CA Stomach	Subtotal gastrectomy with FJ	SS	03.10 PM	88	90	91	95	92	94	90	131	135	132	128	125	133
19	05/08/2017	Thangamani	57	F	35213	Periampullary Carcinoma	Pyloroplasty& FJ	SGE-1	4.05 PM	102	100	99	103	106	102	97	142	140	137	144	146	139
20	05/10/2017	Kathirvean	44	M	34298	Cholelithiasis	Open cholecystectomy	S-4	1.40 PM	114	109	112	114	108	105	102	152	148	144	149	147	144
21	05/12/2017	Saravanan	49	M	33181	Aorto iliac occlusion	Aorto bifemoral bypass	VS-2	04.15 PM	109	105	103	104	102	104	100	148	147	144	142	145	150
22	13/5/2017	Sundaram	53	M	34020	CA Oesophagus	VATS	SGE-1	05.20 PM	99	100	102	98	101	97	95	164	146	145	139	142	140
23	15/5/2017	Thanigachalam	56	M	35252	CA Rectum	Low anterior resection	SGE-2	3.05 PM	89	92	90	94	88	90	92	129	133	135	128	130	132
24	18/5/2017	Usha	48	F	33143	CA Stomach	Subtotal gastrectomy with FJ	SGE-1	2.20 PM	99	101	97	94	95	98	95	133	136	137	134	130	137
25	18/5/2017	Nagammal	45	F	32890	Pseudocyst of Pancreas	Internal Drainage	S-1	1.45 PM	120	114	108	110	105	102	100	142	134	130	128	132	134
26	21/5/2017	Sudhakar	49	M	33132	Rt iliac occlusion	Sequential bypass	VS-1	3.00 PM	94	89	91	92	94	93	95	88	128	130	134	130	129
27	22/5/2017	Karthikeyan	52	M	32890	CA Gall bladder	Cholecysectomy with Rt hepatectomy	SGE-2	4.45 PM	112	108	110	104	108	104	99	102	148	145	143	140	142
28	24/5/2017	Sudalaimuthu	55	M	33121	Cholelithiasis	Open cholecystectomy	SGE-2	1.30 PM	100	98	97	96	99	94	98	95	132	128	124	130	127
29	26/5/2017	Arul	40	M	40514	Distal gastric cancer	Subtotal gastrectomy with Whipples procedure with FJ	SGE-1	5.10 PM	99	101	102	98	100	101	100	97	140	138	136	139	134
30	27/5/2017	Sumathi	47	F	37289	CA OG junction	Total gastrectomy with Roux en Y Oesophageo jejunal anastomosis & FJ	SGE-2	5.50 PM	112	108	107	104	106	101	99	100	140	134	1136	137	139
						T-PIECE EXTUBATION GROUP																
1	04/02/2017	Karuppusamy	46	M	14734	Insulinoma	Distal pancreatectomy with splenectomy	ES-2	2.00 PM	108	104	103	102	106	112	107	152	147	133	118	114	116
2	04/04/2017	Arul	58	M	36121	Periampullary carcinoma	Whipples procedure	SGE 2	4.45 PM	111	108	109	114	104	105	99	134	137	132	129	130	126
3	04/04/2017	Surendhar	49	M	31222	Distal gastric cancer	Subtotal Gastrectomy with FJ	SGE-1	3.30 PM	98	99	102	89	88	84	86	142	140	134	134	136	1228
4	04/06/2017	Chinnapaiyan	52	M	30182	Aorto iliac occlusion	Aorto Bifemoral bypass	VS-1	3.35 PM	89	92	90	94	90	88	89	118	122	128	126	122	114
5	04/08/2017	Somasundaram	39	M	32128	Chronic calcific pancreatitis	Frey's procedure	SGE-1	4.50 PM	111	108	104	107	106	104	101	130	128	133	137	129	132
6	04/11/2017	Mahalakshmi	61	F	37834	CA Lower 1/3 Oesophagus	Transhiatal Esophagectomy	SGE-1	4.15 PM	94	97	94	95	100	95	93	107	105	110	104	100	106
7	04/12/2017	Soundar	39	F	38824	Cholelithiasis	Open Cholecystectomy	GS-4	1.15 PM	122	118	120	124	115	112	114	152	155	149	147	147	150
8	14/4/2017	Natarajan	47	M	39111	Aorto iliac occlusion	Aorto Bifemoral bypass	VS-2	3.40 PM	95	97	100	94	98	95	94	132	134	130	128	133	129
9	15/4/2017	Manickam	36	M	38882	Achalasia Cardia	Modified Heller's Myotomy	SGE-2	3.05 PM	88	91	87	89	85	86	85	128	124	130	127	122	124
10	15/4/2017	Muniraj	45	M	39234	Periampullary carcinoma	Whipples procedure	SGE-2	4.10 PM	92	93	97	94	92	91	94	119	121	124	120	118	121
11	17/4/2017	Sarangapani	52	M	39712	CA Oesophagus	VATS	SGE-1	5.45 PM	71	74	77	70	73	72	75	132	128	128	128	125	132
12	18/4/2017	Kumaran	44	M	34198	Chronic calcific pancreatitis	Frey's procedure	SGE-2	3.50 PM	97	98	96	100	102	92	89	140	134	132	129	130	128
13	21/4/2017	Lakshmi	40	F	40212	Cholelithiasis	Open Cholecystectomy	SGE-1	2.45 PM	110	107	104	105	98	96	98	138	134	129	133	128	130
14	22/4/2017	Sukumaran	30	M	38129	CA Oesophagus	VATS	SGE-2	4.35 PM	102	99	99	94	92	95	97	140	132	133	129	137	132
15	23/4/2017	Kalathi	58	M	39191	Aorto iliac occlusion	Aorto Bifemoral bypass	VS-2	3.50 PM	121	118	117	124	122	119	120	108	112	110	118	122	115
16	24/4/2017	Govindan	52	M	38973	CA Lower 1/3 Oesophagus	Transhiatal Esophagectomy	SGE-1	4.15 PM	89	87	92	94	88	89	85	130	127	125	129	130	127
17	27/4/2017	Parasuraman	49	M	40111	CA Gall bladder	Cholecysectomy with Rt hepatectomy	SGE-2	5.15 PM	96	94	98	92	94	93	90	140	137	135	134	137	138
18	30/4/2017	Murugaiyan	55	M	39928	Distal gastric cancer	Subtotal Gastrectomy with FJ	SGE-2	2.40 PM	104	102	99	100	98	95	93	118	122	118	117	120	124
19	05/02/2017	Dhanakoti	54	F	40227	Aorto iliac occlusion	Aorto Bifemoral bypass	VS-1	3.05 PM	80	84	82	81	87	88	84	130	134	135	132	137	130
20	05/05/2017	Kothandan	42	M	40390	Periampullary carcinoma	Whipples procedure	SGE-1	3.40 PM	100	97	96	91	93	90	91	131	133	127	130	124	127
21	05/06/2017	Sudhakar	33	M	40521	CA Lower 1/3 Oesophagus	Transhiatal Esophagectomy	SGE-2	3.55 PM	90	93	92	89	87	86	87	117	122	118	114	120	125
22	05/09/2017	Arivazhagan	39	M	41118	Chronic calcific pancreatitis	Frey's procedure	SGE-1	4.10 PM	85	86	84	89	87	85	88	129	128	132	134	127	126
23	05/10/2017	Sundaram	59	M	42008	Proximal Gastric CA	Total gastrectomy with Roux en Y Oesophageo jejunal anastomosis & FJ	SGE-2	02.50 PM	80	84	81	82	85	79	82	132	135	132	128	124	127
24	05/12/2017	Mustafa	55	M	41890	Periampullary Carcinoma	Pyloroplasty& FJ	SGE-2	12.45 PM	72	70	74	74	71	77	75	124	119	122	120	119	116
25	15/5/2017	Solomon	51	M	41184	Rt iliac occlusion	Sequential bypass	VS-1	2.35 PM	88	92	94	87	84	86	85	133	135	1336	124	129	130
26	18/5/2017	Velmurugan	47	M	42827	Aorto iliac occlusion	Aorto Bifemoral bypass	VS-2	04.15 PM	101	99	97	93	94	89	90	142	138	134	140	137	129
27	20/5/2017	Suganthi	39	F	43100	Cholelithiasis	Open Cholecystectomy	GS-2	01.10 PM	111	118	121	108	105	102	100	155	158	149	148	150	138
28	22/5/2017	Meena	52	F	40292	CA Lower 1/3 Oesophagus	Transhiatal Esophagectomy	SGE-1	03.47 PM	83	85	80	82	79	83	84	127	130	132	126	130	127
29	25/5/2017	Shankaran	47	M	42221	Periampullary carcinoma	Whipples procedure	SGE-2	04.05 PM	98	99	102	97	94	95	88	142	129	134	136	130	129
30	30/5/2014	Parvathy	55	F	38250	CA Lower 1/3 Oesophagus	VATS	SGE-1	5.15 PM	102	89	88	84	87	89	90	134	134	131	129	132	134

VITALS	DBP							SPO2							ETCO2							BASELINE GAS VALUES			
30	0	5	10	15	20	25	30	0	5	10	15	20	25	30	0	5	10	15	20	25	30	FIO2	PH	PCO2	PO2
134	106	102	98	99	96	98	99	100%	100%	100%	100%	100%	100%	100%	28	30	29	31	31	32	34	100%	7.365	28.0	334
135	100	96	90	87	88	83	86	100%	100%	100%	100%	100%	100%	100%	34	36	36	34	35	36	37	100%	7.302	37.2	479
181	98	102	100	97	96	100	95	100%	100%	100%	100%	100%	100%	100%	30	33	33	34	30	32	31	100%	7.341	34.0	378
130	71	74	76	68	71	74	70	100%	100%	100%	100%	100%	100%	100%	40	38	37	34	36	37	35	100%	7.323	37.0	345
134	93	90	95	92	89	88	88	100%	100%	100%	100%	100%	100%	100%	29	32	33	32	36	36	37	100%	7.409	34.0	409
149	112	117	109	112	97	95	99	100%	100%	100%	100%	100%	100%	100%	39	42	40	43	39	41	40	100%	7.201	43.0	449
158	88	84	87	80	83	84	82	100%	100%	100%	100%	100%	100%	100%	37	37	38	40	38	39	36	100%	7.190	38.9	462
154	91	88	89	90	92	94	88	100%	100%	100%	100%	100%	100%	100%	34	35	36	36	35	37	37	100%	7.330	33.2	389
139	88	92	90	91	94	92	90	100%	100%	100%	100%	100%	100%	100%	40	41	39	38	40	38	39	100%	7.221	39.1	425
114	70	72	64	68	72	69	73	100%	100%	100%	100%	100%	100%	100%	27	26	25	28	30	30	32	100%	7.470	24.1	585
134	98	94	85	88	90	92	90	100%	100%	100%	100%	100%	100%	100%	42	41	43	44	44	41	45	100%	7.270	44.3	477
140	90	88	84	89	91	89	86	100%	100%	100%	100%	100%	100%	100%	27	26	27	30	31	29	32	100%	7.426	25.6	451
148	80	86	84	79	80	82	82	100%	100%	100%	100%	100%	100%	100%	38	37	35	34	36	36	35	100%	7.191	40.6	408
115	64	66	64	59	62	65	62	100%	100%	100%	100%	100%	100%	100%	33	35	32	36	34	35	34	100%	7.380	34.1	667
122	110	98	87	87	84	78	80	100%	100%	100%	100%	100%	100%	100%	35	37	34	36	35	36	37	100%	7.350	35.5	495
127	122	70	72	69	71	74	70	100%	100%	100%	100%	100%	100%	100%	29	31	33	32	35	34	34	100%	7.520	31.9	453
97	98	72	64	66	62	60	59	100%	100%	100%	100%	100%	100%	100%	26	25	27	29	28	28	30	100%	7.459	23.5	345
130	82	78	81	84	78	77	81	100%	100%	99%	99%	100%	99%	100%	41	42	41	39	40	40	40	100%	7.372	42.0	457
138	92	95	94	93	90	88	89	100%	100%	100%	100%	100%	100%	100%	38	37	37	37	39	38	40	100%	7.332	36.9	412
144	100	94	97	98	96	92	89	100%	100%	100%	100%	100%	100%	100%	33	32	31	33	35	35	36	100%	7.341	33.2	344
143	94	95	93	94	90	92	89	100%	100%	100%	100%	100%	100%	100%	37	38	37	36	37	37	36	100%	7.328	40.2	409
138	97	95	94	98	94	95	92	100%	100%	100%	100%	100%	100%	100%	29	39	38	39	38	37	37	100%	7.293	38.5	388
128	90	92	94	89	88	84	87	100%	100%	100%	100%	100%	100%	100%	40	41	41	40	39	39	40	100%	7.341	40.0	467
128	89	87	88	90	84	87	86	100%	100%	100%	100%	100%	100%	100%	41	39	40	41	40	39	39	100%	7.372	41.0	444
140	86	85	88	82	78	80	78	100%	100%	100%	100%	100%	100%	100%	34	37	36	35	36	38	38	100%	7.312	42.2	421
135	90	88	91	89	92	90	86	100%	100%	100%	100%	100%	100%	100%	37	36	39	38	38	38	37	100%	7.321	44.0	423
139	95	94	93	90	92	91	89	100%	100%	100%	10000%	100%	100%	100%	33	34	34	33	34	35	35	100%	7.442	32.8	389
130	88	84	88	90	87	90	84	100%	100%	100%	100%	100%	100%	100%	37	36	37	36	36	37	35	100%	7.362	37.1	408
130	90	87	84	88	82	84	86	100%	100%	100%	100%	100%	100%	100%	38	37	37	38	38	37	38	100%	7.205	29.2	461
134	89	87	89	84	87	86	82	100%	100%	100%	100%	100%	100%	100%	40	39	38	38	38	39	38	100%	7.345	34.5	442
120	98	94	92	88	90	92	90	100%	100%	100%	100%	100%	100%	100%	34	34	33	35	37	36	36	100%	7.441	34.8	268
128	77	74	76	68	70	74	78	100%	100%	100%	100%	100%	100%	100%	36	37	37	37	36	37	37	100%	7.371	36.4	404
130	72	70	78	68	74	72	77	100%	100%	99%	99%	99%	100%	100%	42	40	39	38	40	38	38	100%	7.412	40.2	384
120	82	80	78	77	69	72	74	100%	100%	100%	100%	100%	100%	100%	44	43	42	43	43	41	41	100%	7.364	43.7	343
130	76	77	80	81	82	75	71	100%	100%	100%	100%	98%	99%	99%	33	34	36	35	34	34	33	100%	7.432	31.9	362
112	65	64	68	63	64	66	65	98%	98%	99%	99%	100%	100%	100%	45	46	43	43	43	42	43	100%	7.294	46.2	257
137	102	104	99	101	98	99	87	97%	98%	98%	98%	100%	100%	100%	37	37	39	38	38	38	40	100%	7.382	36.2	313
136	87	90	92	84	86	82	85	99%	99%	100%	100%	100%	100%	100%	39	40	39	39	40	40	41	100%	7.366	39.1	345
120	76	77	74	75	72	74	70	100%	100%	100%	100%	100%	100%	100%	37	38	38	38	37	37	38	100%	7.315	36.6	454
124	72	70	72	71	71	72	70	98%	98%	99%	98%	99%	99%	99%	39	40	40	39	39	39	40	100%	7.321	39.2	315
130	84	78	82	86	83	84	80	100%	100%	100%	100%	100%	100%	100%	40	42	42	41	41	42	42	100%	7.392	41.7	327
130	90	84	86	82	80	82	82	99%	100%	100%	100%	100%	100%	100%	42	41	43	40	40	41	40	100%	7.417	41.4	411
128	84	86	84	87	82	83	80	100%	100%	100%	100%	100%	100%	100%	39	38	38	37	38	38	39	100%	7.364	37.7	387
127	77	80	85	82	80	78	82	100%	100%	100%	100%	100%	100%	100%	41	40	40	41	39	38	38	100%	7.391	40.7	401
118	65	67	64	66	62	68	67	98%	98%	99%	99%	99%	100%	100%	43	49	50	48	48	47	47	100%	7.241	49.2	253
124	72	74	72	70	72	72	70	100%	100%	100%	100%	100%	100%	100%	37	38	37	37	36	37	37	100%	7.372	37.4	403
130	89	84	86	86	82	84	84	99%	100%	100%	100%	100%	100%	100%	40	39	40	39	40	39	39	100%	7.399	41.8	367
120	74	74	70	72	68	67	70	100%	100%	100%	100%	100%	100%	100%	38	38	36	37	37	36	37	100%	7.408	38.2	355
132	89	91	92	88	87	84	86	100%	100%	100%	100%	100%	100%	100%	37	36	37	37	36	37	37	100%	7.341	43.4	311
1227	91	88	90	87	88	84	85	100%	100%	100%	100%	100%	100%	100%	33	34	34	35	36	36	36	100%	7.442	33.4	278
124	70	68	66	70	69	72	74	100%	100%	100%	100%	100%	100%	100%	36	36	35	36	37	37	37	100%	7.392	40.1	394
122	85	82	[illegible]	82	84	80	80	100%	98%	98%	98%	99%	100%	98%	46	44	44	43	44	43	43	100%	7.292	45.5	244
122	85	82	90	88	82	85	84	100%	100%	100%	100%	100%	100%	100%	39	38	38	39	37	37	38	100%	7.346	39.5	434
120	68	72	71	66	70	68	67	100%	100%	100%	100%	100%	100%	100%	36	37	37	37	36	37	37	100%	7.421	37.5	483
126	77	78	80	82	77	75	76	100%	100%	100%	100%	100%	100%	100%	40	38	39	38	38	39	38	100%	7.342	39.6	444
132	84	86	82	80	88	85	84	100%	100%	100%	100%	100%	100%	100%	38	37	38	38	39	38	37	100%	7.394	38.6	428
134	103	100	102	99	94	92	95	99%	99%	100%	100%	100%	100%	100%	42	43	43	43	41	41	40	100%	7.292	42.8	299
122	85	82	84	82	84	80	83	100%	100%	100%	100%	100%	100%	100%	34	35	35	36	36	36	36	100%	7.439	33.7	489
126	80	84	82	84	87	90	84	100%	100%	100%	100%	100%	100%	100%	37	37	36	36	37	37	37	100%	7.396	37.7	442
137	92	94	90	92	94	90	88	100%	100%	100%	100%	100%	100%	100%	30	29	30	30	31	32	32	40%	7.481	29.6	143

GAS VALUES IN CPAP-PSV WITH PS 15CMH2O				GAS VALUES IN SBT WITHCPAP-PSV				GAS VALUES IN SBT WITH T-Piece with O2- 4L/min				Extubation time	GAS VALUES 24hrs after extubation					Reintubation	Duration of MV
FIO2	PH	PCO2	PO2	FIO2	PH	PCO2	PO2	FIO2	PH	PCO2	PO2		FIO2	PH	PCO2	PO2		Y/N	
40%	7.462	26.1	295	40%	7.447	28.3	191					06/04; 12.50PM	21%	7.419	31.3	150		N	20hrs 20 min
40%	7.366	31.2	171	40%	7.370	32.9	180					08/04; 06.20 AM	21%	7.348	31.1	129		N	16 hrs 45 min
40%	7.431	56.4	179	40%	7.450	27.1	148					11/04; 02.15 PM	21%	7.361	36.1	132		N	21 hrs 30 min
40%	7.342	33.2	147	40%	7.420	31.1	171					11/04; 01.25 PM	21%	7.377	35.2	145		N	23 hrs 55 min
40%	7.381	36.0	132	40%	7.350	40.9	190					12/04; 12.30 PM	21%	7.372	34.8	128		N	19 hrs 30 min
40%	7.328	44.4	109	40%	7.330	48.6	142					19/04;06.30 PM	21%	7.362	41.2	129		N	24 hrs
40%	7.320	39.2	143	40%	7.348	41.1	136					20/04;02.35 PM	40%	7.328	44.2	139		Y	22 hrs 50min
40%	7.362	38.1	149	40%	7.377	39.2	166					23/04;06.05 AM	21%	7.408	39.2	137		N	15 hrs 50 min
40%	7.341	39.2	129	40%	7.361	41.2	151					24/04;09.10 AM	21%	7.364	38.1	144		N	15 hrs 55 min
40%	7.280	31.2	178	40%	7.346	38.3	170					22/04;08.40 PM	21%	7.375	41.2	130		N	28 hrs
40%	7.391	33.7	155	40%	7.403	35.5	131					27/04;11.35AM	21%	7.421	37.5	98		N	30 hrs 20 min
60%	7.451	29.5	142	40%	7.442	34.8	135					28/4; 06.45 AM	21%	7.437	36.2	112		N	12 hrs 45 min
40%	7.456	31.1	166	40%	7.408	31.6	168					29/04; 06.30 AM	21%	7.413	34.4	121		N	12 hrs
40%	7.380	36.3	167	40%	7.340	38.5	125					30/4;09.35 AM	21%	7.37	37.1	120		N	19 hrs 20 min
40%	7.320	39.7	136	40%	7.360	32.7	151					30/4; 06.45 AM	21%	7.383	34.6	101		N	14 hrs 10 min
40%	7.490	25.3	122	40%	7.430	31.6	168					04/05;08.05 AM	21%	7.412	35.2	107		N	17 hrs 10 min
40%	7.439	30.6	123	40%	7.422	35.0	139					07/05; 08.12 AM	21%					N	16 hrs 7 min
40%	7.381	42.1	144	40%	7.391	39.4	153					08/05;07.15 AM	21%	7.401	40.0	122		N	16 hrs 5 min
40%	7.352	40.0	135	40%	7.364	41.1	180					09/05; 09.15 AM	21%	7.368	39.4	118		N	17 hrs 10 min
40%	7.363	37.1	145	40%	7.355	39.8	139					11/05;06.05 AM	21%	7.371	40.1	120		N	16 hrs 25 min
40%	7.361	39.9	159	40%	7.381	40.2	150					13/05; 02.15 PM	21%	7.377	41.2	114		N	22 hrs
40%	7.344	40.1	133	40%	7.352	40.5	149					14/05; 11.05 AM	21%	7.362	42.1	112		N	17 hrs 45 min
40%	7.362	41.2	145	40%	7.381	42.0	138					15/05;05.45 PM	21%	7.370	41.4	120		N	26 hrs 40 min
40%	7.363	40.8	142	40%	7.369	41.8	141					19/05;06.10 AM	21%	7.357	42.2	118		N	15 hrs 50 min
40%	7.348	41.0	155	40%	7.352	42.0	148					19/05; 08.15 AM	21%	7.363	44.2	120		N	18 hrs 30 min
40%	7.354	42.9	149	40%	7.348	41.7	147					22/05;09.20 AM	21%	7.354	42.4	108		N	18 hrs 20 min
40%	7.427	35.1	151	40%	7.412	37.0	147					23/05; 07.15 AM	21%	7.401	36.5	112		N	14 hrs 30 min
40%	7.381	36.4	148	40%	7.355	36.9	144					24/05; 08.00 AM	21%					N	17 hrs 30 min
40%	7.331	39.1	152	40%	7.351	37.0	140					27/05;09.15 AM	21%	7.372	37.7	108		N	16 hrs 5 min
40%	7.352	40.1	160	40%	7.371	39.2	137					28/05;11.20 AM	21%	7.382	38.0	111		N	17 hrs 30 min
40%	7.458	36.0	112					28%	7.380	34.1	92	04/04; 04.30 PM	40%	7.341	31.1	89		Y	45 hrs 30 min
40%	7.382	37.5	156					28%	7.341	33.4	110	05/04; 06.35 PM	21%	7.335	35.2	102		N	25 hrs 50 min
40%	7.377	35.2	144					28%	7.422	41.5	115	05/04; 02.50 PM	21%	7.453	44.3	124		N	23 hrs 40 min
40%	7.381	39.2	138					28%	7.342	44.1	101	07/04; 02.25 PM	40%	7.401	43.2	91		Y	22hrs 50 min
40%	7.411	36.3	148					28%	7.412	42.2	120	09/04; 03.00 PM	21%	7.431	45.2	111		N	22 hrs 10 min
40%	7.335	40.2	108					28%	7.399	41.2	118	12/04; 03.45 PM	21%	7.352	43.1	111		Y	23 hrs 30 min
40%	7.401	41.2	111					28%	7.421	43.7	117	13/04; 06.35 AM	21%	7.398	42.5	120		N	17 hrs 20 min
40%	7.381	40.0	121					28%	7.381	40.8	122	16/04;07.20 AM	21%	7.396	41.6	115		N	39 hrs 40 min
40%	7.333	38.2	140					28%	7.329	43.1	110	16/04; 04.10 PM	40%	7.326	41.2	120		Y	25 hrs 5 min
40%	7.343	40.1	124					28%	7.322	45.1	83	16/04; 02.15 PM	40%	7.351	42.1	108		Y	22 hrs 5 min
40%	7.377	40.2	145					28%	7.401	43.2	111	18/04; 04.30 AM	21%	7.384	41.1	112		N	22 hrs 45 min
40%	7.401	41.0	126					28%	7.385	42.2	120	19/04; 03.25 PM	21%	7.401	42.2	109		N	23 hrs 35 min
40%	7.372	38.2	150					28%	7.372	39.4	109	22/04; 08.55 AM	21%	7.384	38.0	114		N	18 hrs 10 min
40%	7.388	39.2	114					28%	7.397	40.4	115	24/04; 07.30 AM	21%	7.385	39.5	107		N	38 hrs 55 min
40%	7.331	44.1	108					28%	7.341	42.1	107	24/04; 04.15PM	40%	7.323	45.6	99		Y	24 hrs 25 min
40%	7.380	38.1	124					28%	7.373	37.4	112	25/04; 03.45 PM	21%	7.367	39.2	109		N	23 hrs 30 min
40%	7.387	40.4	138					28%	7.357	43.2	106	29/04; 09.45 AM	40%	7.371	42.9	129		Y	40 hrs 30 min
40%	7.411	39.0	152					28%	7.404	40.2	112	01/05; 06.50 AM	21%	7.381	41.9	120		N	16 hrs 10 min
40%	7.362	42.1	144					28%	7.37	43.2	109	03/05; 1.15 PM	21%	7.401	42.2	111		N	22 hrs 10 min
40%	7.385	38.2	133					28%	7.376	39	114	06/05; 02.05 AM	21%	7.383	40.4	107		N	22 hrs 25 min
40%	7.383	39.2	129					28%	7.404	38.8	120	07/05; 12.00 PM	21%	7.382	41.0	97		N	20 hrs 5 min
40%	7.333	41.9	119					28%	7.348	42.2	111	10/05; 02.40 PM	40%	7.332	42.9	104		Y	22hrs 30 min
40%	7.362	41.0	134					28%	7.388	39.2	117	11/05; 03.55 PM	21%	7.381	39.0	107		N	25 hrs 5 min
40%	7.409	38.8	142					28%	7.412	39.2	122	13/05; 06.35 AM	21%	7.424	40.2	114		N	17 hrs 50 min
40%	7.366	38.2	155					28%	7.375	38	119	16/05; 12.10 PM	21%	7.392	41.0	109		N	21 hrs 35 min
40%	7.349	40.2	149					28%	7.382	39.7	110	19/05; 02.25 PM	21%	7.377	38.9	113		N	22 hrs 10 min
40%	7.399	36.5	152					28%	7.372	40.4	113	20/05; 09.15 AM	21%	7.365	42.1	99		N	20 hrs 5 min
40%	7.377	39.2	147					28%	7.382	37.7	126	24/05; 09.45 AM	21%	7.404	38.4	100		N	41 hrs 58 min
40%	7.431	38.0	151					28%	7.382	38.6	122	26/05; 01.45 PM	21%	7.364	37.2	105		N	23 hrs 40 min
								28%	7.401	41	102	31/05; 4.10 PM	21%	7.322	43.0	76		N	22 hrs 55 min